



BUREAU OF
PLANT
INDUSTRY

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WISCONSIN DEPARTMENT OF AGRICULTURE, TRADE AND CONSUMER PROTECTION
2811 Agriculture Drive Madison, Wisconsin 53718



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Bureau Director Message



Brian Kuhn

A handwritten signature in black ink that reads "Brian D. Kuhn". The signature is fluid and cursive, with a long horizontal stroke at the end.

Bureau Director

It was anything but business-as-usual in the Plant Industry Bureau in 2015. Developing the state's first Pollinator Protection Plan, hosting the annual meeting of the Horticultural Inspection Society Central Chapter, and certifying over \$1 billion in plant product exports were only a few of our staff's new initiatives and accomplishments.

Several new projects were undertaken in the past year. The Bureau's Nursery Program was one of eight state programs participating in the Systems Approach to Nursery Certification (SANC) pilot project, an innovative, risk-based approach intended to enhance the nursery stock certification process. The SANC approach focuses inspector and producer attention on critical control points or processes in nursery stock production and allows nursery stock growers to develop their own tailored best-management practices for these control points. SANC is expected to improve uniformity among state programs, expedite shipments, and reduce the spread of nursery and greenhouse pests.

Continuing to limit the impact of costly invasive forest pests like emerald ash borer (EAB) and gypsy moth was also a top priority in 2015. Although the gypsy moth is becoming more widely established in the western counties, monitoring and treatment programs in Wisconsin remain pivotal in delaying its progression into Minnesota and other uninfested areas. Similarly, while the spread of EAB cannot be prevented, our survey efforts are providing important data on EAB's distribution and range expansion.

The following report showcases the breadth and scope of the work conducted all year long by the Plant Industry Bureau's skilled staff. This dedicated team of plant science professionals continues to defend the state's agricultural and natural resources against the entry, establishment, and spread of damaging plant pests, while facilitating the export of Wisconsin plants and plant products.



EXPORT CERTIFICATION Program

The Export Certification Program provides inspection and certification services for plants and plant products intended for interstate or international commerce. Objectives of the program are to facilitate the export of Wisconsin agricultural products and to prevent the spread of plant pests.

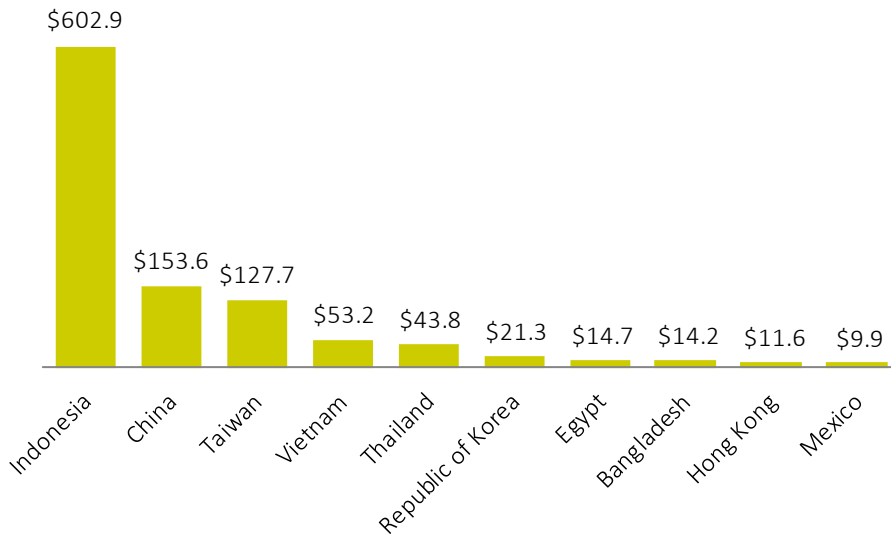
The Plant Industry Bureau issues two types of phytosanitary certificates: federal certificates for plants and plant products destined for foreign markets, and state certificates for interstate commerce. Authorized certification officials review the plant pest standards set by each country for each commodity, and assist customers in understanding the requirements for obtaining certification. Product certification may be based on field inspection, lab testing, surveys, or insect trapping. Since entry requirements are continually under revision, program staff routinely monitor changing plant pest regulations and update their knowledge of the phytosanitary import standards for over 200 countries.

Exports of plant products certified by the Bureau set a record of \$1.1 billion in 2015. This represents a 23% increase from \$850 million in 2014, and is 88% higher than \$129.6 million ten years ago. The number of phytosanitary certificates issued this year was 7,117, including 6,811 federal certificates and 306 state certificates. Of the federal certificates, 6,718 were phytosanitary certificates, 64 were processed plant product certificates, and 29 were re-export certificates. The state certificates consisted of 270 plant inspection certificates and 36 phytosanitary certificates.

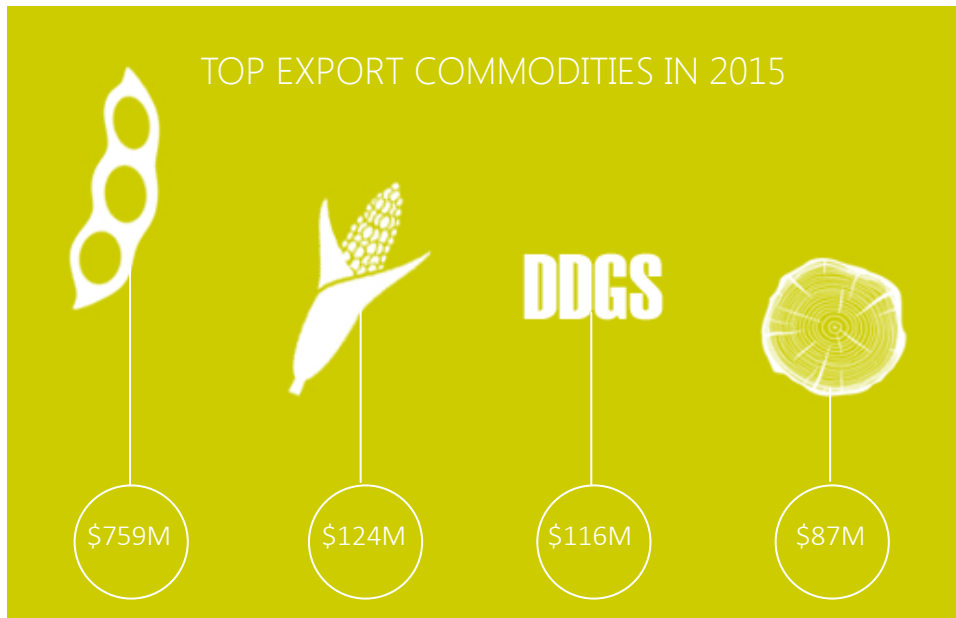
Soybean products were the leading export commodity, accounting for \$758.7 million of the total \$1.1 billion in plant products certified this year, followed by corn products (\$124.2 million). Other major exports were distillers dried grains (\$115.7 million) and lumber, logs, and veneer (\$86.9 million). Indonesia, China, Taiwan, Vietnam, and Thailand represented the top five markets in 2015 for Wisconsin exports. Indonesia received 55% percent of the state's plant product exports, mostly soybeans, while China received 14%, Taiwan received 12%, and both Vietnam and Thailand received 5% or less.

Increased requirements for phytosanitary certification by importing countries and higher demand for grains and other Wisconsin agricultural products are the main factors driving the surge in requests for export certification.

TOP EXPORT MARKETS FOR WI PLANT PRODUCTS

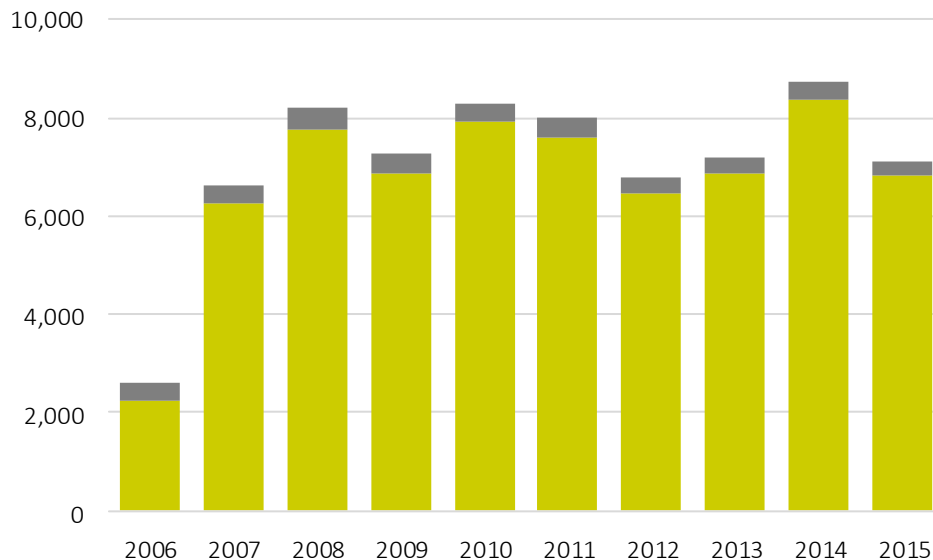


Indonesia, China, Taiwan, Vietnam and Thailand were the top five markets in 2015 for Wisconsin exports. Indonesia received 55% percent of the state’s plant product exports, mostly shipments of soybeans.



Soybeans and soybean products were the leading export commodity this year, accounting for \$759 million of the total \$1.1 billion in plant products certified, followed by corn products (\$124 million), distillers dried grains (\$116 million), and wood products (\$87 million).

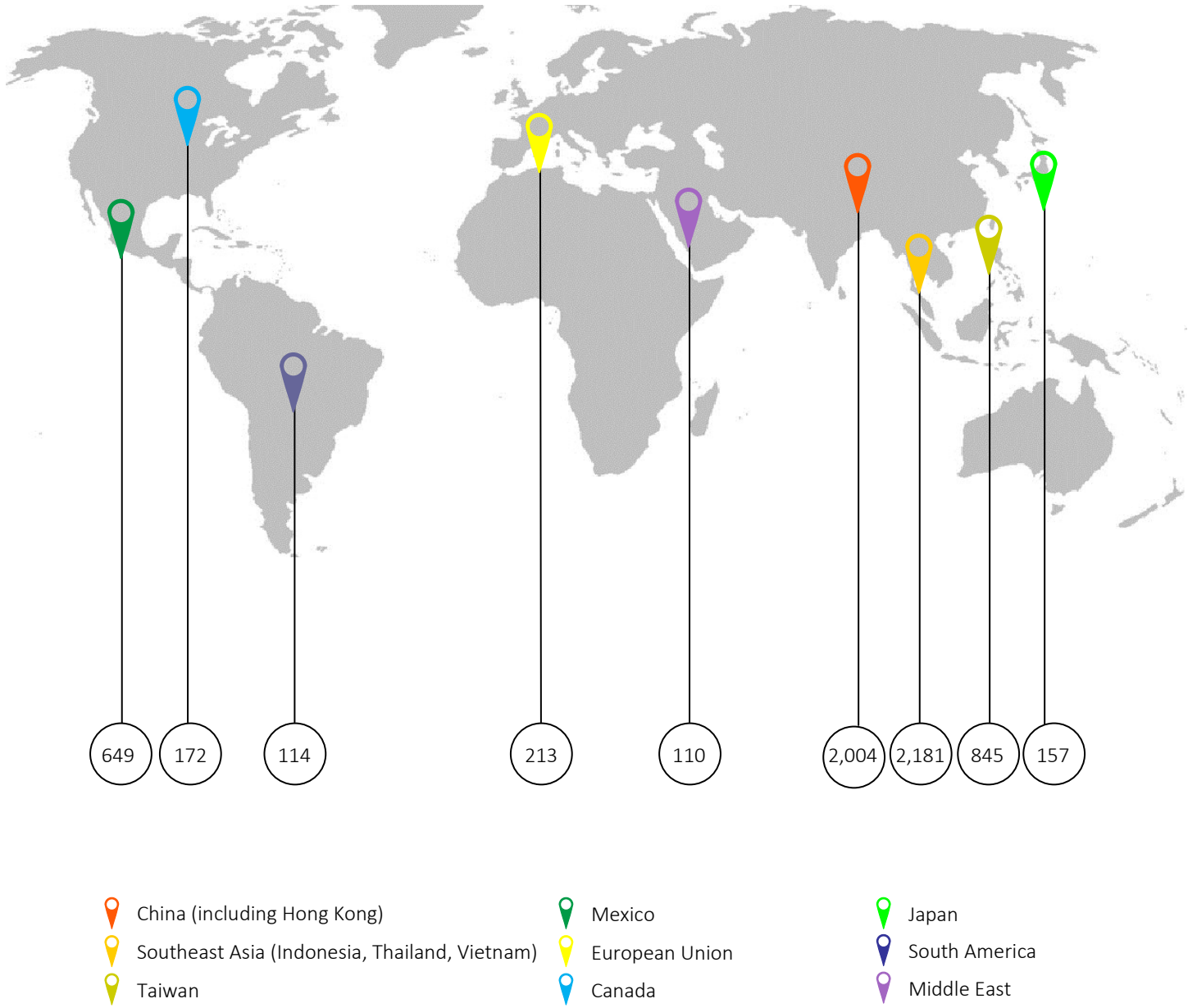
TEN-YEAR TREND IN NO. OF CERTIFICATES ISSUED



Legend: Federal (blue), State (grey)

Program staff issued 6,811 federal certificates and 306 state certificates, for a total of 7,117 certificates in 2015.

NUMBER OF EXPORT CERTIFICATES ISSUED IN 2015 AND DESTINATIONS



TOP EXPORT MARKETS

DATCP certified a record \$1.1 billion in plant and plant product exports in 2015



SEED CONTROL Program

The Seed Control Program monitors agricultural, lawn, and vegetable seed to ensure seed labeler and dealer compliance with the quality standards prescribed by the Wisconsin Seed Law. Seed that does not meet label guarantees or conform to purity, germination rate, and noxious weed seed restriction standards may be removed from the marketplace or be subject to other penalties. Field inspectors in the program check labels for consistency and accuracy, issue stop sale orders, and collect samples for analysis.

In 2015, the Seed Program issued licenses to 725 seed labelers. Approximately one-third of the labelers (236) were visited by field inspectors, and 343 seed samples were collected. Of the total collected samples, 73 were vegetables, 50 were corn, 44 were lawn grass mixtures, 25 were alfalfa, and 20 were oats. Another 156 of the samples comprised various lawn grasses (46), pasture mixtures (36), legumes (24), large grains (16), cereals (8), and native seed (1). Pasture and grass mixtures represented about 37% of the collected total.

Seed industry violations declined to a record low this year. Sixteen violations were found in 343 samples, for a 4.7% violation rate. Four of the violations were categorized as technical, five were considered minor, and seven were classified as serious. The following compliance actions were taken: 1) seven seed lots were relabeled, 2) two lots were removed from sale by the labeler, 3) two lots were returned by retailers to the labelers, 4) five lots were planted before compliance actions could be enforced. The low 2015 violation rate is well below the 10-year average of 9.4% and indicates improvement in labeling compliance.

Number of seed labelers inspected, samples collected and violation rates, 2006-2015.

Year	No. of Labelers	No. of Samples	No. of Violations	Violation Rate	Labelers Inspected	Labelers Sampled
2006	689	333	37	11.1%	30%	14%
2007	685	332	40	12.1%	36%	17%
2008	690	242	24	9.9%	33%	11%
2009	675	280	27	9.6%	34%	15%
2010	685	308	38	12.3%	33%	15%
2011	725	336	33	9.8%	23%	13%
2012	729	335	38	11.3%	30%	12%
2013	725	375	30	8.0%	26%	14%
2014	730	341	18	5.3%	29%	12%
2015	725	343	16	4.7%	33%	14%
10-yr Average	706	323	30	9.4%	31%	13%



NURSERY Program

The Nursery Program provides regulatory inspection of licensed retail and wholesale nurseries to ensure the production and sale of healthy, insect- and disease-free plants. Inspectors enforce licensing requirements and issue certificates needed to facilitate the movement of nursery stock in trade.

Program personnel inspected 429 fields of the 894 fields (48%) listed with the 623 licensed nursery growers in the state this season, a slight decrease from 452 fields inspected in 2014. A total of 691 of the 1,982 retail locations (35%) of the 1,096 licensed nursery dealers were inspected compared to 433 locations inspected in the previous year.

Nursery inspections in 2015 found one new pest and confirmed several symptomatic plant samples to be negative for diseases of regulatory concern. Summarized below are this year's program highlights.

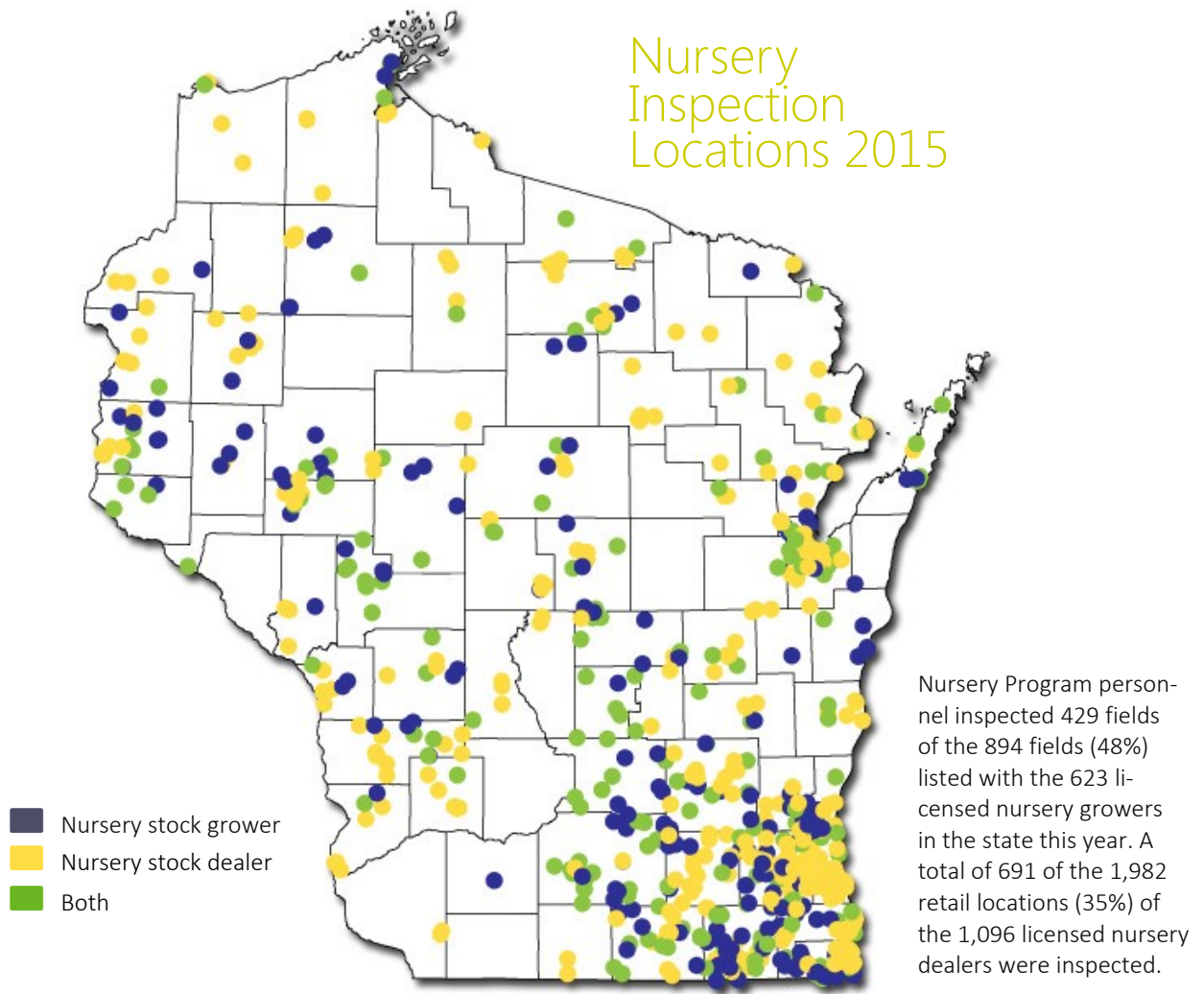
DAYLILY LEAFMINER: Reported for the first time in Wisconsin in 2014, the daylily leafminer (DLM) was observed to have overwintered successfully and has been found in the landscape. The larvae of this insect feed between the upper and lower leaf surfaces, creating long, white mines that run parallel to leaf veins. Infested daylilies are not killed by DLM, but usually are unmarketable.

FOLIAR NEMATODE: An increasingly common and serious problem in the nursery industry, foliar nematode was detected this year in seven plant samples, on the hosts anemone, hosta, and toad lily. DATCP enforces zero tolerance to foliar nematodes in production nurseries and recommends that any nematode occurrence be thoroughly cleaned and disinfected.

BOXWOOD BLIGHT: Eight suspect boxwood blight samples, four boxwoods and four pachysandras, were tested by the Plant Industry Laboratory in 2015. None were found to be positive for boxwood blight. All eight were instead infected with the more common *Volutella* blight.

RALSTONIA SOLANACEARUM: Three Wisconsin nurseries received plants from a Guatemalan nursery that tested positive for *Ralstonia solanacearum* race 1. The nurseries were contacted by the supplier and instructed to destroy all potentially infected host material and surrounding plants. The pathogen race identified (race 1) is not the race 3 biovar 2 that is a regulated quarantine pest listed as a select agent by the USDA Agricultural Bioterrorism Protection Act. Bacteria called *R. solanacearum* attack almost 200 plant species in 33 different plant families, constituting one of the largest known host ranges for any plant pathogenic bacterium.

SUDDEN OAK DEATH: One rhododendron sample tested negative for this regulated disease. The sample was a "trace-forward" from a western U.S. nursery confirmed to have plants infected with *Phytophthora ramorum*, the plant pathogen known to cause sudden oak death (SOD). As of December 2015, SOD has never been detected in the state.



SANC PILOT PROGRAM

Wisconsin is one of eight states participating in the Systems Approach to Nursery Stock Certification (SANC) pilot program being developed by the National Plant Board (NPB). SANC is an innovative approach intended to enhance the nursery stock certification process, expedite shipments, and improve uniformity among inspection programs, while reducing the spread of harmful nursery and greenhouse pests.

The SANC approach focuses inspector and producer attention on critical control points or processes in nursery stock production, such as propagative plant parts, growing media, pots, pest and disease pathways, and water management. Inspectors work directly with the nursery stock grower to develop tailored best-management practices for each of these control points, allowing inspectors to certify stock as free of harmful plant pests. The voluntary program benefits participating states by enhancing existing programs and focusing resources to reduce pest risk. McKay Nursery in Waterloo, Wisconsin is an ideal SANC candidate due to its protective practices and diverse scope of operation. McKay is on track to become SANC certified in 2016.

INVASIVE SPECIES RULE

Revisions to the Invasive Species Rule (Wis. Adm. Code ch. NR 40) making it illegal to possess, transport, transfer, or introduce certain invasive species in Wisconsin without a permit went into effect in May of 2015. Included in the revisions were the addition of 49 new prohibited species, 32 new restricted species, and two species split-listed as both prohibited and restricted. Many of the aquatic and terrestrial plants included on the updated lists, such as dame's rocket and Chinese wisteria, were previously common in the nursery trade.

Although the rule changes provide exemptions for some cultivars and a phase-out period of 3-5 years for plants newly categorized as "restricted," the phase-out option does not apply to the invasive plants on the "prohibited" list, thus rule violations increased markedly following enactment of the revisions. DATCP inspectors documented violations at 43 locations this season, compared to 13 locations in 2014 and 19 in 2013. Compliance is expected to improve in the season ahead as more nurseries become familiar with the rule changes.

CHRISTMAS TREE Program

Last fall more than 600,000 fir, pine, and spruce trees were harvested from Wisconsin Christmas tree fields, placing the state sixth in the nation in Christmas tree sales. Christmas trees may harbor a range of plant pests and diseases and provide a high-risk pathway of pest introduction as hundreds of thousands of trees are cut and exported from the state each year.



Mark Hoffman
Milwaukee Journal
Sentinel

By licensing, inspecting and certifying Christmas trees as being free from regulated pests such as the gypsy moth and pine shoot beetle, the Christmas Tree Program provides a service to producers of trees, wreaths, and roping who require certification to ship their products to other states or foreign countries. Growers of trees marketed locally also benefit by receiving periodic inspections that identify a wide range of common insect and disease pests affecting their trees.

Annual field inspections begin after the gypsy moth egg mass deposition period, usually by September 1. All pine Christmas trees and pine material originating in Wisconsin are subject to the federal Pine Shoot Beetle quarantine, and all Christmas tree species (fir, pine and spruce) originating in the state's 50-county gypsy moth quarantine zone are subject to the federal and state Gypsy Moth quarantines. Growers shipping trees from the quarantined areas into states or countries where the

pine shoot beetle and gypsy moth are not established are required to have their trees inspected and certified free of these pests prior to harvest. Choose-and-cut farms and other growers selling within the quarantine are not restricted. A Plant Health Certificate is used for shipments of trees to other states, while a Phytosanitary Certificate is required for international shipments.

In 2015, program inspectors visited 679 of the 763 Christmas tree grower fields (89%). Ten of the fields were found to be infested with gypsy moth, while pine shoot beetle was detected at six sites in Milwaukee, Sheboygan, Ozaukee, and Waukesha counties. Of the non-regulated pests noted during inspections, balsam twig aphid was the most common insect, and frost damage was the most prevalent abiotic disorder observed. The Program licensed 367 Christmas tree growers in 2015.

Top five Christmas tree pests in 2015, followed by number of fields affected out of 679:

DISEASES & ABIOTICS: frost damage (276), white pine blister rust (75), *Rhizosphaera* on fir (68), *Rhizosphaera* on spruce (54), and broom rust on fir (52).

INSECT PESTS: balsam twig aphid (276), balsam gall midge (139), white pine weevil (88), Eastern spruce gall adelgid (30), and Zimmerman pine moth (29).

SEED FIELD Inspection



Agricultural crops grown for seed export, including beans, corn, onions, soybeans, and tomatoes, are inspected by DATCP during the growing season for insects and diseases of regulatory significance. Field inspection services are provided to seed companies and growers requesting assistance to meet the phytosanitary requirements of their domestic and international customers. This year, 82 seed production fields on 629 acres were inspected. A total of 64 samples were collected and tested at the Plant Industry Laboratory for a range of bacterial, fungal, and viral diseases. Results were as follows:

CORN WILT DISEASES: Corn leaf samples from seed corn production fields were tested for the bacterial diseases Goss's wilt and Stewart's wilt. Goss's wilt was confirmed in 15 of 39 samples (38%) from Adams, Dane, Eau Claire and Rock counties. This represents a marked increase from 2014 when 9% of samples tested positive. Results for Stewart's wilt were negative.

SEED CORN VIRUSES: Lab testing of corn leaves from 39 seed corn fields inspected in 2015 found three Dane County fields to be positive for sugarcane mosaic virus and maize dwarf mosaic virus, both considered to be viruses of export significance. All fields were apparently free from maize chlorotic mottle virus and High Plains virus.



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 in Wisconsin.

DATCP certified 33 firewood dealers in 2015. A total of 74 companies have been certified to sell firewood in Wisconsin since the rule was enacted in 2007.



APIARY Program

The Apiary Program monitors the apiculture industry to prevent the introduction and spread of harmful honey bee parasites and diseases. Inspection services are offered to all beekeepers, though emphasis is placed on migratory bee colonies and package-bees entering Wisconsin in spring from states such as Alabama, California, Florida, Georgia, Louisiana, Mississippi, Missouri, Tennessee and Texas, and those hives leaving in fall that require apiary health certification. Thirty-seven apiary inspection certificates were issued for migratory hives departing last October and November.

Program statistics showed a decrease in imported colonies and nucleuses, from 40,337 in 2014 (including hives imported for pollination) to only 13,484 in 2015, and an increase in imported queens and packages, from 52,271 in 2014 to 65,131 in 2015. Colony losses over the winter months were estimated at 57%. Multiple factors—including inadequate forage and nutrition, pesticide exposure, parasites and viruses, genetics, and bee management practices—are thought to have contributed to the losses.

Annual apiary inspections for honey bee pests and diseases found increases in European foulbrood and small hive beetle, and a decrease in Varroa mite infestations. A total of 1,190 hives were inspected this year, 475 in spring and 715 in fall. The rise in European foulbrood cases from 0.8% to 3.6% was traced to infected packages entering Wisconsin last spring and a lack of prophylactic treatments upon installation. Small hive beetle was found in 3.2% of hives (38 hives) from ten counties: Brown, Calumet, Dane, Jefferson, Lafayette, Marathon, Polk, Sauk, St. Croix and Walworth. By contrast, the percentage of hives infested with Varroa mite decreased from 82% in 2014 to 71% in 2015.

Annual apiary inspection results, 2011-2015.

Apiary Pest	2011	2012	2013	2014	2015
No. hives checked	1,045	1,503	1,184	1,152	1,190
Varroa mite	85%	89%	71%	82%	71%
American foulbrood	4.0%	1.3%	0.9%	0.7%	1.1%
Chalkbrood	3.5%	3.2%	1.7%	2.3%	3.1%
Deformed wing virus	3.7%	5.9%	1.0%	1.0%	6.8%
European foulbrood	1.3%	1.1%	2.1%	0.8%	3.6%
Sacbrood	1.4%	1.2%	1.4%	1.3%	0.1%
Small hive beetle	3.4%	2.9%	1.4%	2.6%	3.2%



To address concerns about honey bee health, the future of honey and crop production, and pollinator decline, DATCP and University of Wisconsin-Madison researchers have developed the state's first Pollinator Protection Plan intended to promote the health and recovery of pollinator populations in Wisconsin through voluntary actions. Plan development involved 31 key stakeholders, including beekeepers, farmers, industry leaders, land managers, scientists, and governmental agencies and non-governmental organizations over a two-year period.

Stated goals of the plan are to:

- 1) improve public understanding of pollinator health issues and factors that affect pollinators, and
- 2) minimize risks to pollinators through reasonable voluntary measures.

A final draft published in March can be accessed on the DATCP website at:

http://datcp.wi.gov/Farms/Bees_and_Honey/index.aspx?Id=225.

POTATO Program

POTATO ROT NEMATODE: The Potato Rot Nematode (PRN) Program has played a major role in limiting the spread of PRN since 1953. PRN has never been intercepted in shipments of commercially grown potatoes or seed potatoes from Wisconsin. Today, there are a total of 3,049 acres with a history of PRN infestation. Of these acres, 95% are located in Langlade County, the largest seed potato production area in the state.

Applications for inspection in 2015 were received for six fields totaling 202 acres, all located in Langlade County. The six fields were new to potato production and required preliminary inspection to be eligible to produce certified seed potatoes. All six fields were negative for PRN.

LATE BLIGHT: The University of Wisconsin-Madison (UW) confirmed the state's first case of late blight in 2015 on June 23 in a 70-acre Adams County potato field. Additional cases of the disease on potato were later identified in La Crosse, Marquette, Portage, Waushara, Winnebago, and Wood counties. DATCP issued a pest abatement order and worked with the UW-Extension and UW Seed Potato Certification Office to respond to the detections. This season marked the seventh consecutive year that environmental conditions favored late blight development in Wisconsin potatoes.



CROP PEST Surveys



The Pest Survey Program conducts field surveys to detect new or exotic plant pests and to assess the distribution, abundance, or incidence of endemic insects, plant diseases, and nematodes affecting Wisconsin agriculture. Information acquired through these surveys is used to alert growers and agriculture professionals to pest occurrence and outbreaks, determine pest trends influencing agricultural management practices, and to certify Wisconsin plants and plant products entering trade are free from regulated pests. The program also participates in plant disease and insect survey projects in cooperation with the United States Department of Agriculture and the University of Wisconsin.

EUROPEAN CORN BORER: Larval populations declined to 0.02 borer per plant this fall, the lowest state average in the 74-year history of Wisconsin European corn borer surveys. Minor population reductions from 2014 were found in four of the state's nine agricultural districts, while negligible increases were documented in the southwest, south-central, central, east-central and northeast areas. Eighty-six percent of the fields examined (196 of 229) showed no evidence of corn borer infestation. Based on the fall survey results, it is apparent that the extensive use of transgenic Bt corn continues to be a major suppression factor on Wisconsin's European corn borer population.

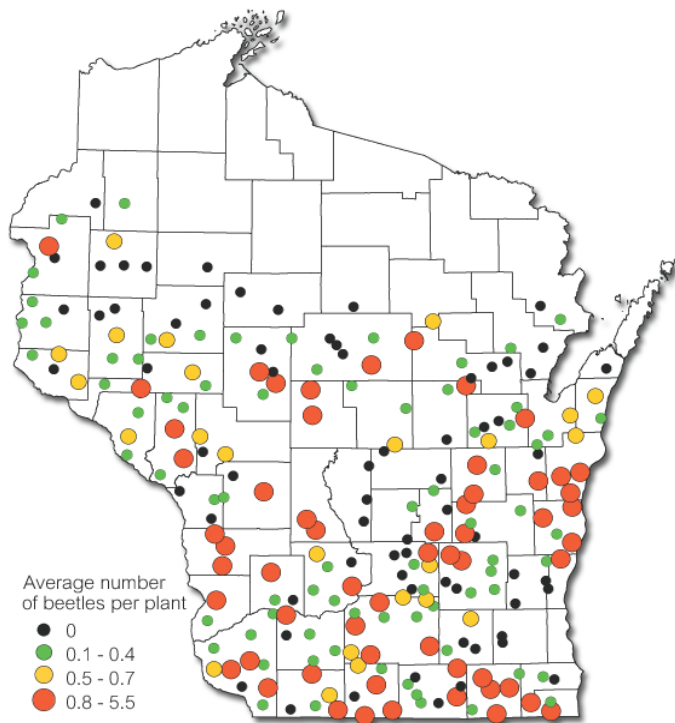
CORN ROOTWORM: Beetle counts increased from 2014 across the eastern half of the state and decreased in western Wisconsin in 2015, a reversal from last year's survey trend. The August beetle survey found substantial population increases from 0.3 to 0.8 beetles per plant in the south-central and east-central areas and low to moderate increases in southeast, central, north-central, and northeast Wisconsin. Averages in the west-central and northwest areas were low at less than 0.3 beetles per plant, while counts in the southwest decreased but remained above the 0.75 beetle-per-plant threshold that indicates root damage potential for next summer. The 2015 state average count of 0.6 beetles per plant compares to 0.4 per plant in 2014.

Results of the survey suggest a greater threat of larval rootworm damage to continuous corn in 2016, with the highest risk in the southwest, south-central and east-central areas where economic averages of 0.8 beetles per plant were recorded.

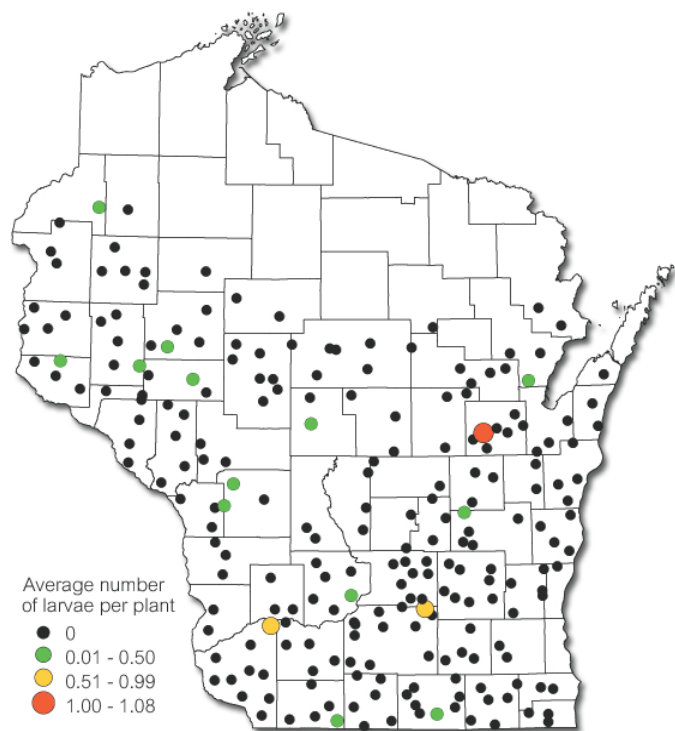
WESTERN BEAN CUTWORM: On the basis of pheromone trap counts, the annual moth flight peaked one week later and was 24% larger than that of 2014. The 2015 cumulative capture of 644 moths in 96 traps (seven per trap) was an increase from the 521 moths in 108 traps collected last year (five per trap), but still extremely low in comparison to the survey record of 10,807 moths in 136 traps (79 per trap) set in 2010. Larval infestations resulting from the flight were light for the sixth consecutive year, and the western bean cutworm was not a major pest of concern for most Wisconsin corn producers this season. Trapping surveys from 2005-2015 show that moth counts have been decreasing since 2010.

SOYBEAN APHID: Densities remained well below the 250 aphid per-plant treatment threshold in the vast majority of Wisconsin soybean fields in 2015. Colonization of soybeans began by June 1, but aphid pressure increased slowly and did not intensify until early August. Control measures were initiated in a few fields by August 12 and continued throughout the month. According to the results of the annual survey, 78% of sites sampled in August had low average densities of less than 50 aphids per plant, while 21% contained moderate counts of 51-249 aphids per plant. A single Winnebago County field sampled on August 24 had an economic population of 313 aphids per plant. The low state average aphid count of 35 per plant at 108 sites surveyed from August 6-26 indicates that most soybeans did not require treatment for aphids this year.

FRUIT PEST Surveys



Corn rootworm beetle survey results, 2015.



European corn borer survey results, 2015.

APPLE ORCHARD PEST MONITORING: A pheromone trap-based monitoring program in 34 cooperating apple orchards throughout the state provided data on the appearance and abundance of five economically important apple pests: apple maggot, codling moth, obliquebanded leafroller, redbanded leafroller, and spotted tentiform leafminer. The trap counts are integral to an IPM approach and are interpreted by growers to understand in-orchard pest levels and time controls for maximum effectiveness. Apple growers using the traps report applying fewer insecticide sprays than they would have in a standard cover spray program and seeing improved pest control.

Cooperators also used pheromone traps to monitor levels of three wood-boring pests, the dogwood borer, lesser peachtree borer and American plum borer, for the first time in 2015. Survey results indicated these three species were more abundant in most orchards than initially thought, and prompted growers to plan for closer inspection of newly planted trees for signs of borer infestation.

SPOTTED WING DROSOPHILA: This invasive Asian vinegar fly was captured by UW-Madison researchers in 42 counties this season. Spotted wing drosophila (SWD) caused severe damage to the state's raspberries, forcing many berry producers to close fields and abandon their plantings in August. Since 2010, SWD has been found in over 50 of the state's 72 counties. Economic loss projections for Wisconsin berry crops due to SWD exceeded \$1.3M in 2014, and could be even higher when 2015 damage estimates are finalized.

EXOTIC GRAPE MOTHS: Eleven vineyards in Brown, Door, Kewaunee, Manitowoc and Sheboygan counties were systematically trapped for exotic grape moths from May 1-September 1. The target pests were the light brown apple moth, European grape berry moth, European grapevine moth, and silver Y moth, all exotic insects of high concern to the state's emerging grape industry and considered "priority pests" for grapes by USDA APHIS. Survey results were negative for all four species.

BROWN MARMORATED STINK BUG: Specimens were collected from 35 additional sites this year, mostly in Dane, Brown and Milwaukee counties. The number of new cases in 2015 far surpasses the total of 18 confirmed reports in the previous five years combined (2010-2014). Based on the number of records originating from the Madison area, brown marmorated stink bug is presumed to be established in Dane County.



FOREST PEST Surveys

EMERALD ASH BORER: Emerald ash borer (EAB) remains the greatest invasive insect threat to Wisconsin's 834 million ash trees. In the eight years since the first detection, EAB has been found in 175 municipalities comprising a projected 2.5 million acres, or just over 7% of the state. EAB finds in 2015 include the capture of beetles on four baited traps and reports of infested trees at 44 municipal sites, for a total of 48 new municipal detections in 22 counties.

Existing EAB infestations in southeastern Wisconsin continued to intensify this year. Five southeastern counties—Kenosha, Milwaukee, Ozaukee, Racine, and Walworth—are now considered to be generally infested. More signs of EAB also continued to develop along the Mississippi River corridor in Grant County, while scattered infestations across parts of south-central Wisconsin have worsened. No new cases of EAB were found in northern Wisconsin where initial infestations were detected in 2013 and 2014 in the cities of Superior (Douglas County) and Rhinelander (Oneida County), respectively.

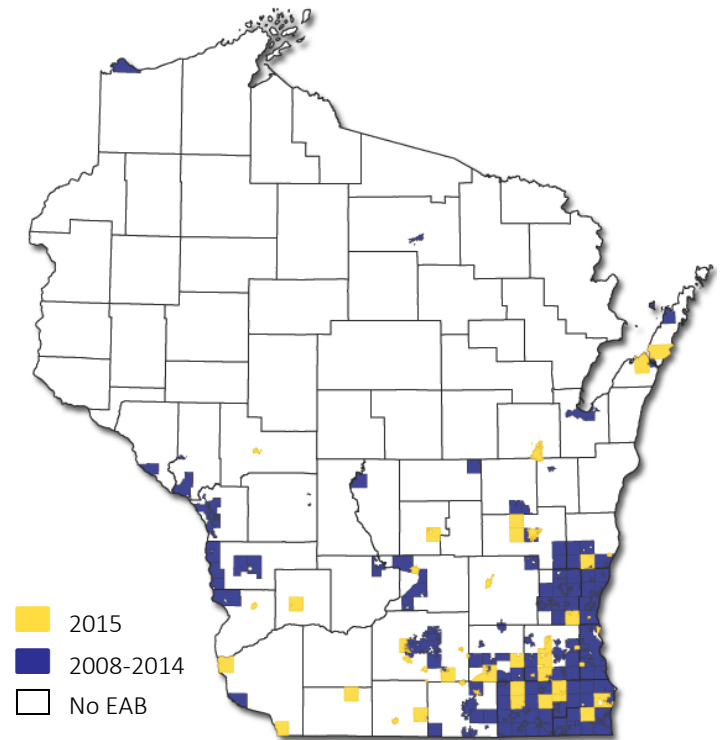
The 2015 EAB trapping survey was a collaborative effort between DATCP, the USDA Animal and Plant Health Inspection Service (USDA APHIS), the Department of Natural Resources (DNR), the Forest County Potawatomi, the Ho-Chunk Nation, and Menominee Tribal Enterprises. The survey consisted of 934 baited traps set across 47 counties, with the majority of traps located in non-quarantined counties in the northern half of the state. Of the 934 traps, 905 were purple panel traps and 29 were green multi-funnel traps. The green funnel traps, used for the first time this season, are thought to perform better than the purple panel traps in low EAB-density areas. Four purple traps, one each in Crawford, Grant, Lafayette and Marquette counties, and one green funnel trap in Richland County, captured EAB adults.

Emerald ash borer infestations now occur in 35 of the state's 72 counties. The 39-county Wisconsin EAB quarantine also includes Iowa, Juneau, Kewaunee and Manitowoc counties based on their close proximity to infestations. An estimated 30% of Wisconsin's ash trees are within the quarantined area.

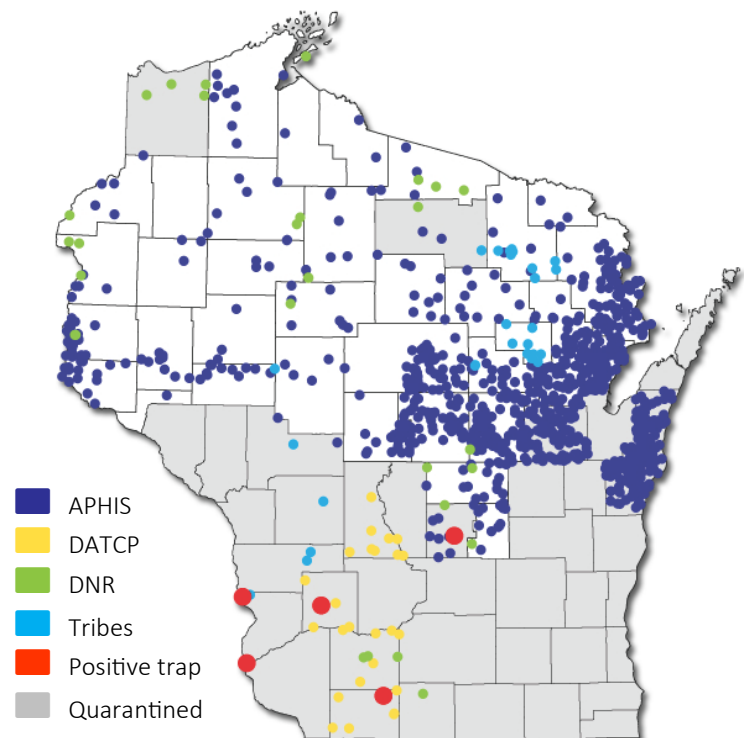
MOUNTAIN PINE BEETLE: Survey work to detect the mountain pine beetle (MPB), the tiny bark-boring insect responsible for killing pine trees over millions of acres in the Western U.S. and Canada in the last decade, was carried out for the second year. Eleven multi-funnel traps were placed at eight forest products facilities in Barron, Brown, Dunn, Forest, La Crosse, Marathon, Portage and Price counties. A total of 56 trap samples were collected in July and August. Results of the 2015 survey were negative.

The threat of MPB to the state's native and commercial pines continues to increase, especially as surplus beetle-killed western U.S. pines are shipped to eastern U.S. markets. MPB could have a devastating impact on Wisconsin's pines and pine-based industries if it were to become established in the state.

VELVET LONGHORNED BEETLE: Four apple orchards in Dane, Kenosha, and Racine counties were surveyed for the velvet longhorned beetle (VLB) this year, in response to the recent discovery of this potential fruit tree and forest pest in the greater Chicago area. Similar to other invasive wood-boring insects, VLB is transported in wood shipping materials and firewood, and has been intercepted in many warehouses across the U.S. since 2002. Established populations are known to occur in Illinois and Utah, with impacts to the orchard industry reported from Utah. Preferred hosts of VLB are apple and mulberry, although ash, birch, cedar, elm, fir, grape, larch, locust, maple, mountain ash, oak, pine, spruce, willow and others may also be attacked. No VLB were detected in Wisconsin as a result of the survey.



Emerald ash borer detections, 2008-2015.



Emerald ash borer cooperative trapping survey, 2015.



FOREST Pests continued...

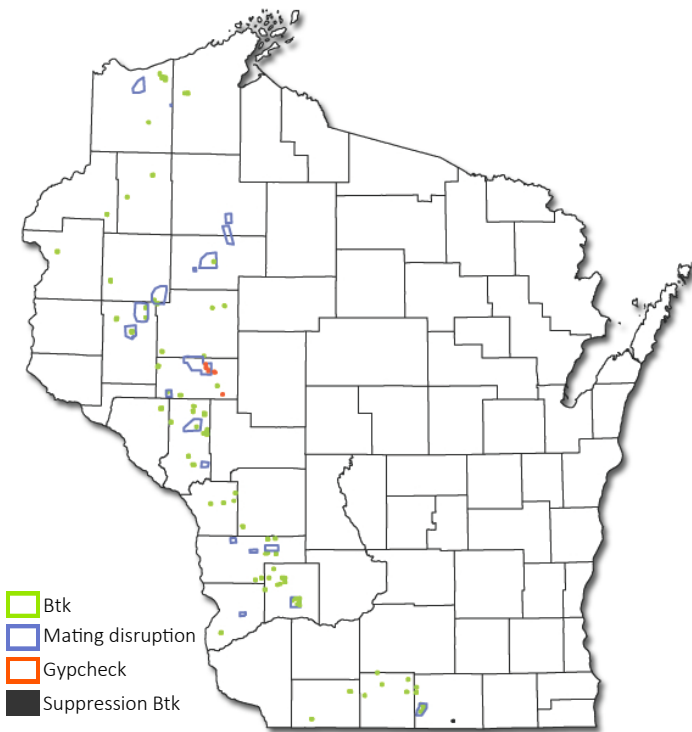
WALNUT TWIG BEETLE: A trapping survey for this insect component of the thousand cankers disease (TCD) complex was conducted for the fourth consecutive year. The survey included 28 pheromone-baited funnel traps set at six municipal brush disposal sites and nine sawmills in Buffalo, Chippewa, Crawford, Dane, Grant, La Crosse, Langlade, Richland, Sauk, Trempealeau, and Waupaca counties. A total of 170 samples were collected from May through September and screened in the laboratory. No walnut twig beetles were found.

Although surveys for TCD have been negative thus far, recent detections of the fungal pathogen and beetle vector in Indiana indicate the risk to Wisconsin's black walnuts and thriving forest products industry is increasing. As a protective measure, DATCP in 2011 enacted an exterior quarantine prohibiting the import of any walnut species or material (excluding bark-free processed lumber or finished wood products and nuts) from known TCD-infested areas without an accompanying compliance agreement and phytosanitary certificate. The quarantine does not restrict the movement of walnut logs, lumber and other walnut material within Wisconsin.

GYPSY MOTH Program

Gypsy moth monitoring and control programs are as vital today as they were in 1971, when the earliest survey efforts began in Wisconsin. One hundred and forty-seven years after its introduction into the U.S., this invasive European forest pest now infests all or parts of 19 eastern states and continues to advance westward. For the last 17 years, Wisconsin has participated in the national Slow the Spread project to impede the expansion of gypsy moth populations into uninfested areas. Male moth trapping, egg mass surveys, and aerial treatments comprise the program. Annual trapping survey data indicate population densities along the leading edge of the gypsy moth's advancing front, and are used to prioritize next year's treatment sites.

During the 2015 aerial treatment program, controls were applied to 232,668 acres (101 sites) in 21 Wisconsin counties. Applications of Btk totaled 28,228 acres; Gypchek treatments totaled 1,202 acres; and mating disruption totaled 203,238 acres. The DNR Suppression Program also treated a 41-acre site (with Btk) in Rock County with Btk. Applications began May 13 and were completed July 14.

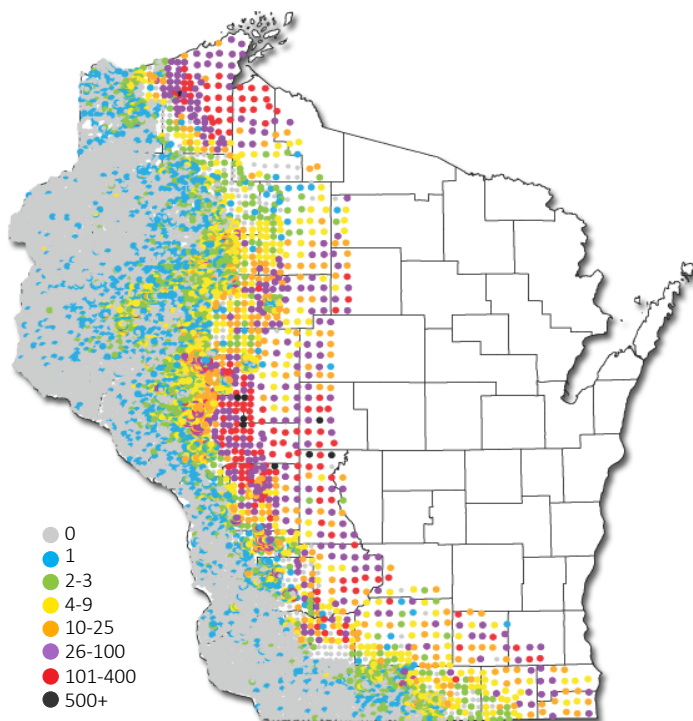


Gypsy moth aerial treatment sites, 2015.

The annual trapping survey found a minor increase in male moth counts. A total of 97,505 male moths were captured in 11,712 traps in 2015 (eight per trap), as compared to 92,786 moths in 13,105 traps (seven per trap) in 2014. Higher moth captures in portions of west-central and southwestern Wisconsin accounted for much of the increase, while trap counts in a few northern Wisconsin counties such as Ashland, Bayfield and Douglas were down from previous years. Program coordinators attribute the minimal change in moth counts over the last two years to frigid winter temperatures, natural enemies, and the fact that fewer traps were set in 2015.

One additional county was added to the state gypsy moth quarantine this year. Taylor County was officially quarantined on March 16, 2015, joining most of eastern and central Wisconsin. Taylor County was the 50th county to be quarantined for gypsy moth.

Since gypsy moth survey and control projects began in Wisconsin in 1971, a total of 975,289 traps have been set and over 3,512,410 acres treated. Annual average moth counts have ranged from as high as 26 moths per trap in 2003 to less than one per trap, with a 25-year average of six per trap. As a direct result of STS and DATCP actions, the national gypsy moth spread rate has been dramatically reduced and the program has prevented the impacts that would have occurred on millions of newly infested acres.



Male gypsy moth trap counts, 2015.



PLANT INDUSTRY Laboratory

The Plant Industry Bureau (PIB) Laboratory provides plant disease diagnostic services to the Christmas Tree Program, the Nursery Program, and the Pest Survey Program. The lab 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 lab by DATCP field specialists.

In 2015, laboratory pathologists diagnosed disorders on 370 field crop samples and screened 317 samples for diseases of nursery plants and Christmas trees. A total of 687 plant and soil samples were processed. Funding for the virus testing of nursery plants was provided by the USDA Specialty Crop Block Program. A USDA APHIS CAPS grant supported the soybean virus, soybean root rot, and cereal cyst nematode surveys.

Laboratory highlights of 2015 were the confirmation of basil downy mildew on basil plants at a Milwaukee County retailer; the testing of boxwood and pachysandra samples for boxwood blight (results were negative); the screening of one trace-forward rhododendron sample which tested negative for *Phytophthora ramorum* (SOD); the finding of foliar nematodes on seven plant samples: Anemone, hosta and toad lily; and the notable absence of impatiens downy mildew, the destructive disease of impatiens that has been widespread in U.S. greenhouses and landscapes in the last 3-4 years. Additional details concerning these plant diseases are provided in the Nursery Section.



SURVEY OF VIRUSES IN ORNAMENTALS: Nursery inspectors submitted 150 virus-symptomatic plant samples from 50 producers and retailers to the PIB Lab for diagnosis last spring. Plants representing 14 genera were tested for up to 12 host-appropriate viruses. Seventy-five of the samples (50%) were infected with at least one virus. Tobacco rattle virus was the most common, with 44 of 85 samples testing positive (52%), followed by the potyvirus group in 15 of 30 samples (50%). Tomato chlorotic dwarf viroid was diagnosed in 10 of 42 samples (24%), impatiens necrotic spot virus was found in six of 41 begonia samples (15%), and cucumber mosaic virus was found in two of 45 samples (4%). Seven of 12 hosta samples were positive for hosta virus X and one dahlia sample was infected with dahlia common mosaic caulimovirus. Results of the survey are summarized in the table below.

Plant Industry Laboratory and Nursery Program Survey of Viruses in Ornamentals, 2015.

Virus Samples	TRV ¹	POTY ²	TCDVD ³	INSV ⁴	CMV ⁵	HVX ⁶	DMV ⁷	AMV ⁸	ArMV ⁹	TMV ¹⁰	TSWV ¹¹
No. of positives	44	15	10	6	2	7	1	0	0	0	0
No. of plants tested	85	30	42	41	45	12	1	5	10	40	38
Percent of positives	52%	50%	24%	15%	4%	58%	NA	0%	0%	0%	0%

¹Tobacco rattle virus; ²Potygroup viruses; ³Tomato chlorotic dwarf viroid; ⁴Impatiens necrotic spot virus; ⁵Cucumber mosaic virus; ⁶Hosta virus X; ⁷Dahlia mosaic virus; ⁸Alfalfa mosaic virus; ⁹Arabis mosaic virus; ¹⁰Tobacco mosaic virus; ¹¹Tomato spotted wilt virus.

TOMATO CHLOROTIC DWARF VIROID: Laboratory analysis of 42 petunia samples from seven greenhouses and retailers found 10 (24%) to be positive for tomato chlorotic dwarf viroid (TCDVd), an emerging disease of greenhouse-produced tomatoes that can be carried in symptomless petunias. Although several petunia varieties, including “Peppy Red”, “Johnny Flame”, “Queen Bee”, “Supertunia”, “Sweetunia”, and “Royal Velvet” were tested, TCDVd was traced to a single variety: “Peppy Lavender.” None of the infected petunias had visible disease symptoms. All “Peppy Lavender” plants were removed from sale and destroyed.

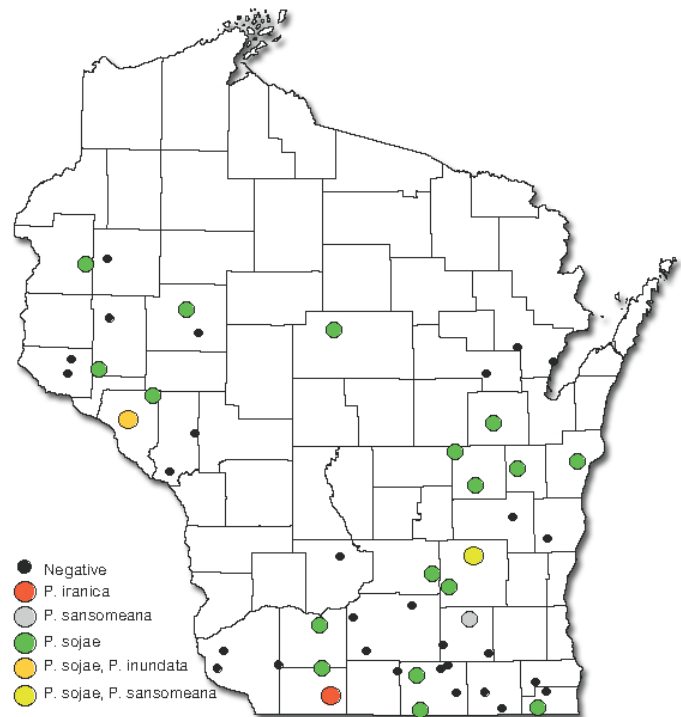
PHYTOPHTHORA ROOT ROT: A June survey to determine the prevalence of soybean root rot caused by *Phytophthora sojae* found a 38% positive rate among the 50 samples tested. This substantial level of prevalence suggests that root rot was a common problem again this season, almost comparable to the 2014 results of 49% of fields sampled, the highest incidence of root rot since the DATCP soybean root rot survey began in 2008. Counties in which *P. sojae* was confirmed were Buffalo, Calumet, Chippewa, Columbia, Dodge, Dunn, Iowa, Kenosha, Lafayette, Manitowoc, Outagamie, Polk, Rock and Winnebago.

A recently-described *Phytophthora* species, *P. sansomeana*, was detected again this year in soybean roots from Jefferson and Dodge counties. *Phytophthora sansomeana* had previously been found on soybean in eight other counties: Calumet, Dane, Dunn, Eau Claire, Green, Outagamie, Marathon and Sheboygan, for a total of 10 counties since the first Wisconsin detection in Jefferson County in 2012.

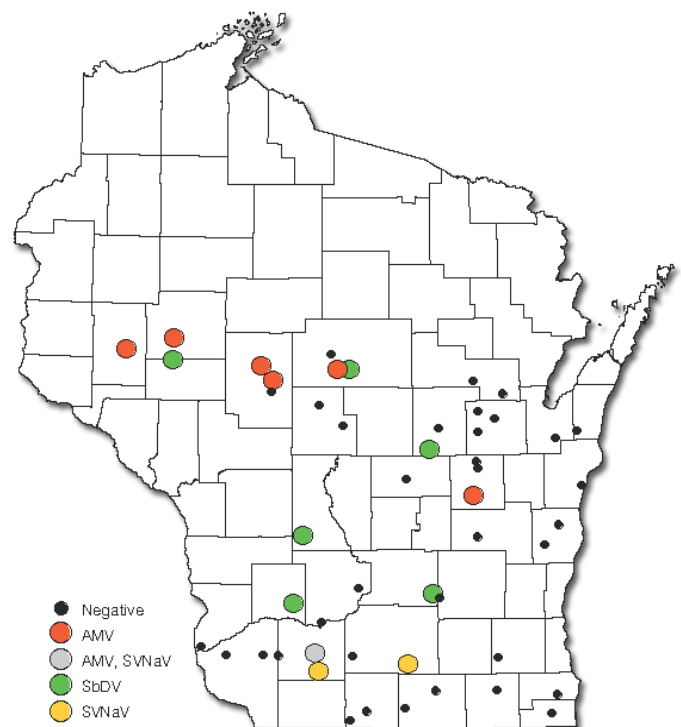
Two other species of *Phytophthora*, *P. inundata* and *P. iranica*, were also found in 2015. The former was detected in soybean roots from Buffalo County, while the latter was isolated from plants from a Lafayette County field. It is not known if these new species cause disease on soybeans.

Cumulative results of this eight-year survey include the detection of five distinct *Phytophthora* species in the state’s soybean fields (also *P. pini* and *P. sp. personii*), four of which had never been found in soybeans in Wisconsin prior to this effort.

SOYBEAN VIRUSES: Fifty soybean fields were sampled and tested for alfalfa mosaic virus (AMV), soybean dwarf virus (SbDV), and soybean vein necrosis-associated virus (SVNaV) this season. Twelve percent of fields were infected with SbDV, a marked decline from the 24% infection rate in 2014. Alfalfa mosaic virus was found in 12% of fields tested compared to 3% the year before. Soybean vein necrosis-associated virus, a tospovirus first detected in Wisconsin in 2012, was found in 6% of samples. The detection of SVNaV has declined since its initial find in 2012 when 35% of fields tested positive. Soybean vein necrosis-associated virus is transmitted by thrips; the decrease in incidence may be associated with lower thrips populations in 2015. The PIB Laboratory has surveyed for AMV, SbDV and other soybean viruses since 2003.



Soybean *Phytophthora* survey results, 2015.



Soybean virus survey results, 2015.