

WISCONSIN

DATCP

PLANT INDUSTRY BUREAU ANNUAL REPORT

2014

NEW & EMERGING PESTS

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HIGHLIGHTS OF 2014

- Emerald ash borer survey results in captures on 9 panel traps...pg 2
- Gypsy moth counts decrease by 63%...pg 3
- Three new *Phytophthora* root rot species found in Wisconsin Christmas trees...pg 5
- Demand for phytos increases to highest level in 3 years...pg 10

Emerald Ash Borer

DATCP expanded the emerald ash borer (EAB) quarantine in 2014 to include new detections in Adams, Buffalo, Calumet, Columbia, Door, Grant, Monroe and Oneida counties, as well as eight other counties in close proximity to EAB infestations: Green, Iowa, Juneau, Kewaunee, Lafayette, Manitowoc, Outagamie and Richland. After the addition of these 16 counties, the EAB quarantine now includes 37 of the state's 72 counties (Figure 1).

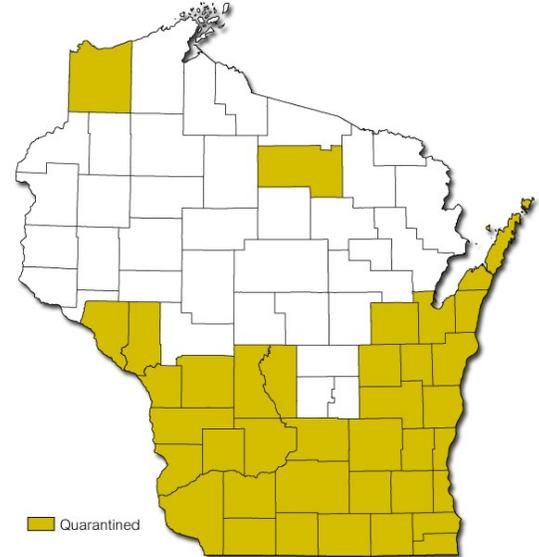


Figure 1. Emerald ash borer quarantine, 2014.

Lily Leaf Beetle

A new state record was established on June 25 with the first detection of lily leaf beetle, an introduced pest of cultivated lilies. This distinctive red and black beetle and its larvae were found by DATCP inspectors in a Marathon County nursery. Another 17 reports of adults, larvae and defoliation were received from July through September. All of the lily leaf beetle finds to date have originated from the Kronenwetter, Mosinee and Rothschild areas of Marathon County in north-central Wisconsin.

Spotted Wing Drosophila

Larvae and adults were confirmed in 20 Wisconsin counties this season. The first flies appeared in traps from June 24-30 and infestations in fruits were prevalent by mid-July. Significant losses to raspberry and blackberry crops were sustained for the third consecutive year. Spotted wing drosophila, the fastest-spreading invasive fruit pest detected in the U.S. and Wisconsin in recent history, has been documented in 36 counties since 2010 and likely occurs statewide.

Brown Marmorated Stink Bug

Specimens were collected from four more locations in 2014. This insect is apparently established in Dane County, though it still has not been observed in any agricultural setting in Wisconsin.

Sudden Oak Death

Eleven ornamental samples, seven rhododendron and four pieris, were tested this year for *Phytophthora ramorum*, the plant pathogen known to cause sudden oak death. The samples were "trace forwards" from a confirmed *Phytophthora ramorum*-infected nursery. Three of the rhododendrons and two pieris were diagnosed with *Phytophthora plurivora*. Another pieris plant was infected with both *P. plurivora* and *P. citrophthora*. All plants were negative for *P. ramorum*.

Walnut Twig Beetle

A third annual trapping survey for this insect component of the thousand cankers disease (TCD) complex was conducted in 2014. The survey included 40 pheromone-baited funnel traps, two per site, set at eight municipal brush disposal sites and 12 sawmills in Buffalo, Chippewa, Crawford, Dane, Grant, La Crosse, Langlade, Manitowoc, Richland, Sauk, Shawano, Trempealeau, Vernon and Waupaca counties. The walnut twig beetle was not detected in the 248 samples collected. Neither the walnut twig beetle nor the *Geosmithia morbida* fungus has been found in Wisconsin to date.

FOREST PESTS

Gypsy Moth



Gypsy moth larva

The Cooperative Gypsy Moth Program consists of field surveys to trap male moths and locate egg masses, and aerial treatments to kill young larvae or disrupt mating. Annual trapping survey data indicate population densities close to the leading edge of the gypsy moth's advancing front and are used to prioritize future treatment sites. Survey results showed a 63% decrease in the state moth count and a 9.70 km retreat in the rate of gypsy moth spread in 2014 (Table 1).

Slow the Spread Treatments

The Slow the Spread (STS) Program's regional strategy is to eradicate isolated or low-level populations west of the "STS Action Zone" and delay spread of the gypsy moth within the zone to 10 km per year. The Program's current 50-million-acre project area is 1,200 miles long and 65 miles wide, and spans 11 states from Minnesota east to North Carolina.

Table 1. Rate of gypsy moth spread in Wisconsin (km), 2010-2014.

Year	Northern WI	Central WI	Southern WI	State Average
2010	21.34	18.55	-2.87	12.36
2011	20.63	-1.23	12.51	10.64
2012	23.79	-1.55	-2.93	6.44
2013	38.37	-0.81	12.20	14.60
2014	-24.50	-2.30	-2.40	-9.70

The state average gypsy moth count decreased markedly, from 19 per trap in 2013 to seven per trap this year.

In 2014, STS treated 165,944 acres (58 sites) in 18 Wisconsin counties. Aerial treatments of Btk totaled 26,775 acres; Gypchek applications totaled 3,600 acres; and mating disruption, which included a single 24,913-acre block treated with Specialized Pheromone and Lure Application Technology (SPLAT), totaled 135,573 acres. The DNR Suppression Program also treated a 29-acre site in Rock County with Btk. Applications began May 22 and ended July 25.

Trapping Results

Moth counts decreased substantially in 2014. The annual trapping survey captured 92,786 male moths in 13,105 traps (seven per trap), a 63% decline from 353,134 moths in 18,513 traps (19 per trap) in 2013. As has been the trend for the past several years, the highest counts were registered in Bayfield (11,228 moths), Jackson (11,700 moths) and Monroe (9,704 moths) counties. A major increase from 994 to 4,884 moths was also documented in Trempealeau County in west-central Wisconsin. Program coordinators attribute the reduction in moths to a frigid winter and abnormally wet spring.



Gypsy moth trap

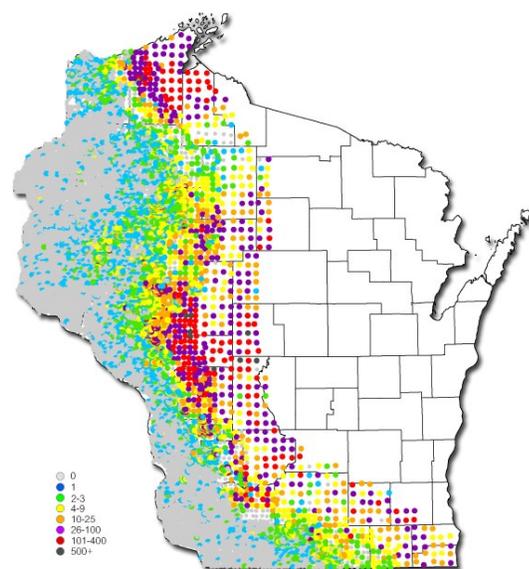


Figure 2. Male gypsy moth trap counts, 2014.

FOREST PESTS *continued...*

Gypsy Moth Quarantine

One additional county was added to the state gypsy moth quarantine this year. Iowa County was officially quarantined on March 31, joining most of eastern and central Wisconsin which are considered generally infested. Iowa County was the 49th county to be quarantined for gypsy moth.

Emerald Ash Borer

Emerald ash borer remains the greatest insect threat to Wisconsin's 834 million ash trees. In the seven years since the first confirmed detection of EAB, this destructive ash pest has been found in 127 municipalities covering a projected 2 million acres, or nearly 6% of the state. Its impact will only escalate as EAB spreads to uninfested areas, which hold about 72% of Wisconsin's ash resource.

Continued survey work for EAB resulted in 51 new detections in 2014. The beetle was captured on nine purple panel traps and infested trees were identified at 42 municipal sites. Existing infestations continued to expand and intensify this year, particularly in the southeastern and southwestern parts of the state where EAB was first discovered in 2008 and 2009, respectively. Dead trees, thinning canopies and other signs of infestation are now evident in these regions.



Emerald ash borer adult

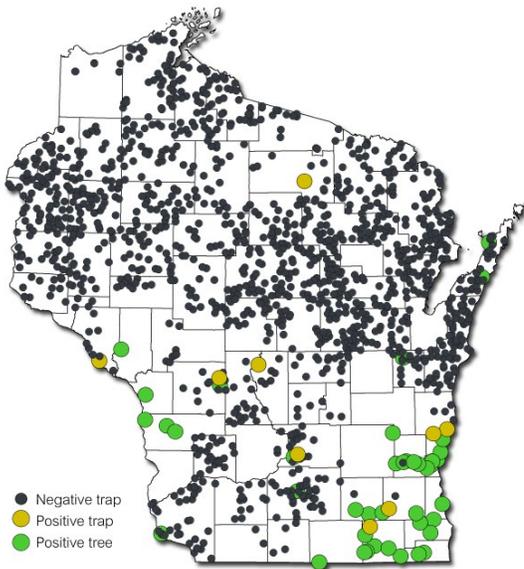


Figure 3. Emerald ash borer detection survey, 2014.

The 2014 Wisconsin EAB trapping survey consisted of 1,301 baited purple panel traps set across 57 counties, with the majority of traps placed in the non-quarantined northern half of the state. Nine of the traps, one each in Adams, Buffalo, Columbia, Monroe, Oneida, Walworth and Waukesha counties and two in Sheboygan County, captured EAB adults (Figure 3).

In response to the 51 new detections, 16 counties were added to the Wisconsin EAB quarantine: eight as the direct result of new finds, and the other half based on close proximity to an infestation. A total of 37 counties have been quarantined for EAB since 2008.

Sixteen new counties were added to the EAB quarantine, for a total of 37 counties quarantined since 2008.

Juneau, La Crosse, Outagamie, Portage, Price, Shawano, Taylor and Waushara counties 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. No MPB specimens were found in the 77 samples examined.

Banded Elm Bark Beetle

New county records for the banded elm bark beetle (BEBB) were established in Waupaca and Waushara counties, for a total of 14 counties since 2009. Survey work conducted at sawmills and municipal wood waste disposal sites yielded 115 specimens from Buffalo (nine beetles), Crawford (one), Grant (three), La Crosse (three), Richland (six), Waupaca (one) and Waushara (92) counties. The list of Wisconsin counties in which BEBB has been confirmed in the last five years also includes Dane, Iowa, Lafayette, Pierce, Sauk, Vernon and Waukesha.

Mountain Pine Beetle

Twenty-two Lindgren funnel traps were placed at 11 forest products facilities in Barron, Dunn,



Mountain pine beetle

CROP PESTS



Pest survey specialist sweeping alfalfa

The Pest Survey Program was established to provide timely information on the abundance and distribution of important pests of Wisconsin field crops. During the growing season, surveys are conducted in alfalfa, corn, potatoes, small grains, snap beans and soybeans. Information acquired through these systematic surveys is used to alert growers, county agents and other agriculture professionals to pest occurrence and outbreaks, determine pest trends affecting agricultural management practices, and 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.

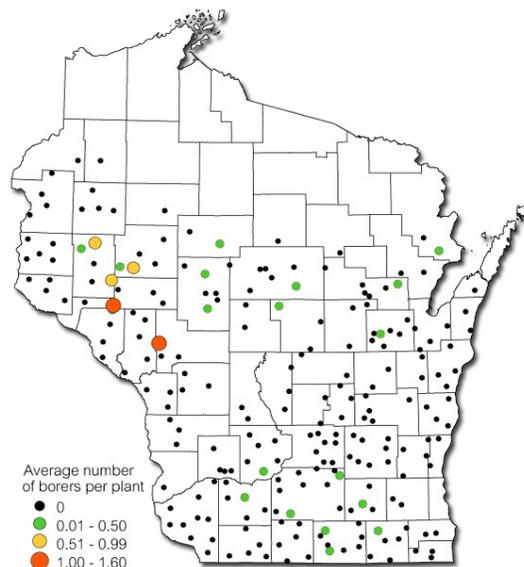


Figure 4. European corn borer survey, 2014.

European Corn Borer

Larval populations declined to an average of just 0.03 borer per plant this fall, tying 2012 as the lowest in the survey's 73-year history. Minor population reductions from 2013 were found in seven of the state's nine agricultural districts, while very slight increases were noted in the west-central and north-central areas. Eighty-four percent of the fields examined (193 of 229) showed no evidence of corn borer infestation (Figure 4). Based on the fall survey results, major change in the nearly decade-long low population trend is not expected for 2015.

Black Cutworm

Migrants began arriving in the state by April 13. The first significant flight was registered near Platteville in Grant County from April 29-May 1 and the primary corn cutting window opened in southwestern Wisconsin on May 29. Spring planting delays and late weed control created very favorable outbreak conditions in June, but cutworm problems failed to materialize. Although the cumulative spring count of 1,068 moths in 34 traps indicated a markedly larger migration than last year's flight of 577 moths in 30 traps, economic damage to emerging corn was not observed this season.

Western Bean Cutworm

The 2014 trapping survey documented the smallest flight in the 10-year history of the monitoring program, collecting only 521 moths in 108 traps (five per trap average). Most sites captured no more than 10 moths during the 10-week trapping period ending August 20. The season's highest cumulative count was just 58 moths near Pine River in Waushara County. Levels of this insect have shown a considerable decline since 2010 when pheromone traps collected the state record count of 10,807 moths in 136 traps (79 per trap average). Larval infestations have also been scarce and the western bean cutworm has not been a major pest of concern for most Wisconsin corn producers in the last four years.

Corn Rootworm Beetle

Results of the annual survey indicate adult corn rootworm populations decreased from 2013 across the eastern half of the state and increased in portions of western Wisconsin. Average counts in the six eastern and central crop districts (SC, SE, C, EC, NC, NE) were all well below the 0.75 beetle per

The 73rd annual European corn borer survey found the lowest state average larval population since 1942.



Western bean cutworm moth

CROP PESTS *continued...*

plant economic threshold at 0.1-0.4 per plant, with the largest population decline from 0.8 to 0.4 beetle per plant observed in the southeast. The average in the northwest was also below-threshold at 0.5 beetle per plant.

By contrast, the survey found higher beetle populations than in 2013 in southwest and west-central Wisconsin, although part of the increase in the southwest was due to an exceptionally high count of 11.2 per plant in one Lafayette County field. Excluding this count, the district average would have been equivalent to the 2013 average at 0.6 beetle per plant. Economic populations of 0.75 or more beetles per plant were found in 36 of the 229 fields surveyed this season (16%), as compared to 18% last year and a five-year average of 25%. The statewide average of only 0.4 beetle per plant is the lowest since 2010 and the second lowest in the survey's history.

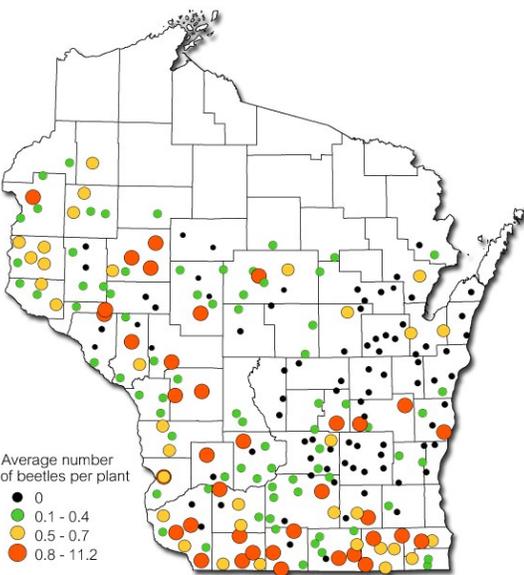


Figure 5. Corn rootworm beetle survey, 2014.

were generally not needed. The first aphids of the season were found on June 10 and densities remained extremely low throughout July at fewer than five aphids per plant. By mid-August, counts were still mostly below 20 per plant, although some isolated sites had developed economic populations above the 250 aphid-per-plant threshold. The average count of 118 aphids per plant documented in late August was a substantial increase over the average of only four per plant in July and, as noted, approximately 20% of surveyed fields may have required treatment for aphid control this year.

Japanese Beetle

Populations were down across the state in 2014 and treatment specifically for this defoliator was not justified for any soybean field sampled by DATCP. A few reports of moderate feeding damage were received from the west-central and northern counties where the Japanese beetle's range is still expanding and it remains a relatively recent pest. Beetle activity persisted through late September.

Exotic Grape Moths

Eleven vineyards in Brown, Door, Kewaunee, Manitowoc and Sheboygan counties were systematically trapped for exotic grape moths from May 1-September 30. The target pests were the light brown apple moth, European grape berry moth, European grapevine moth, and silver Y moth, all insects of high concern to the state's emerging grape industry and considered "priority pests" for grapes by USDA APHIS. No exotic fruit moths were found.



Soybean aphids

The general reduction in rootworm adults suggests that management practices such as crop rotation, soil insecticides, rootworm-resistant transgenic corn varieties, and natural controls, including low soil temperatures and heavy rain, have recently kept numbers at lower levels. Nevertheless, this pest continues to be the most costly insect threat to corn production in Wisconsin (Figure 5).

Soybean Aphid

Densities increased to economically significant levels in about 20% of surveyed fields in late August, though most sites had low or moderate populations this year and control measures

Despite lower levels in 2014, the corn rootworm continues to be the leading insect threat to Wisconsin corn.



Japanese beetle on soybean

PLANT DISEASES

Plant Industry Bureau Laboratory

The Plant Industry Bureau (PIB) Laboratory provides plant disease diagnostic services to the Pest Survey Program, the Nursery and Christmas Tree Inspection programs, and the Environmental Enforcement Section. Plant samples with diseases caused by fungi, bacteria, viruses and nematodes are submitted to the lab by DATCP field specialists. The lab also performs testing for phytosanitary certification necessary for domestic and international export of certain plants.

In 2014, laboratory pathologists diagnosed disorders on 402 nursery stock and Christmas tree samples and screened 364 samples for diseases of field crops. A total of 765 plant and soil samples were processed, including 150 samples for export certification.

Another highlight of 2014 was the move to the new 2601 Agriculture Drive laboratory facility, which also houses the Bureau of Laboratory Services and the State Laboratory of Hygiene.



Canaan fir infected with *Phytophthora* root rot

Phytophthora Root Rot of Christmas Trees

A multiyear survey to identify Phytophthora root rots affecting Wisconsin Christmas trees was completed in 2014. Cumulative results of the four-year project include the detection of six distinct Phytophthora species (*P. cactorum*, *P. europaea*, *P. megasperma*, *P. sp. 'kelmania'*, *P. plurivora*, *P. sansomeana*), three of which were new to the state (*P. europaea*, *P. sp. 'kelmania'*, *P. sansomeana*). In addition, the survey found trees with root rot on 27 of 91 (30%) participating tree farms and a 25% infection rate (47 of 187 samples positive) among the tree samples tested.

Of the seven coniferous hosts sampled, Fraser fir was the most susceptible to root rot, with 36 of 115 (31%) trees testing positive. Balsam fir was the second-most susceptible tree species; eight of 44 (18%) samples analyzed were positive for root rot. Other tree species tested were: Canaan fir, Douglas fir, Nova Scotia fir, pine and spruce.

The most frequently detected Phytophthora species was *P. europaea*, found in 27 of 47 samples (57%), followed by *P. sansomeana* in 10 of 47 (21%) samples. Both *P. europaea* and *P. sansomeana* were first detected in Wisconsin in 2011. *Phytophthora sansomeana* can also infect field crops and has been found on soybeans in nine counties, for a total of 14 counties with confirmed cases of *P. sansomeana* in the last four years. Three other species found during the survey, *Phytophthora cactorum*, *P. megasperma* and *P. plurivora*, were already known to occur in the state, while *Phytophthora sp. 'kelmania'*, a new species first identified in two Wisconsin counties in 2010, was not found from 2011-2014.

Six *Phytophthora* root rot species have been found on Christmas trees farms since 2011, three of which are new to the state.



Christmas tree mortality caused by *Phytophthora* root rot

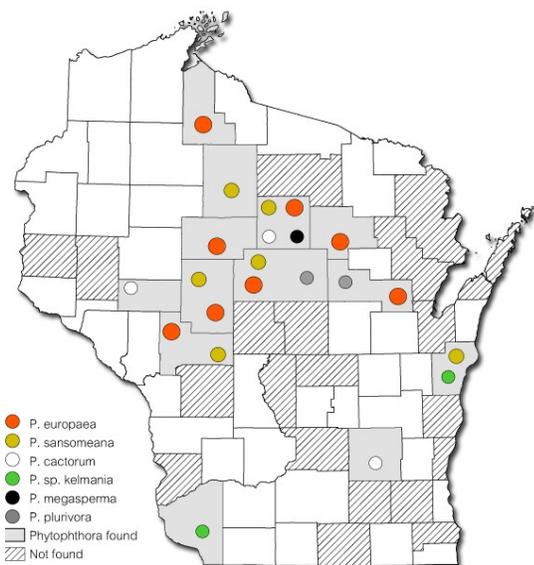


Figure 6. Cumulative Christmas tree *Phytophthora* survey results, 2011-2014.

Figure 6 summarizes the cumulative results of the survey. *Phytophthora* root rot has been found throughout the major Christmas tree-producing areas of the state since 2011, with the exception of the Central Sands, where sandy, well-drained soils are less conducive to the build-up of these water molds.

PLANT DISEASES *continued...*

Survey for Viruses in Ornamentals

Nursery inspectors collected 228 virus-symptomatic plant samples from 71 producers and retailers this season. Each sample was tested for up to 12 host-appropriate viruses. Of the 228 samples, 84 (37%) were infected with at least one virus.

Tobacco rattle virus was the most common virus, with 23 of 102 samples testing positive (27%), followed by the potyvirus group in 19 of 51 samples (37%). Impatiens necrotic spot virus was diagnosed in six of 71 samples (9%), cucumber mosaic virus was found in six of 87 samples (7%), and one of 68 samples (2%) was positive for tomato spotted wilt virus (Table 2).

Several other viruses were also detected. Hosta virus X was found in five of 19 hosta samples (26%), dahlia common mosaic caulimovirus was identified in two of three dahlia samples (67%), and the new clematis chlorotic mottle tomosvirus was diagnosed in five of six clematis plants tested, for an 83% positive rate.

A trace-forward investigation of petunias for tobacco mosaic virus resulted in 12 of 38 samples (32%) testing positive. Nursery inspectors required all virus-infected nursery stock to be removed from sale and destroyed.

Table 2. Survey of Viruses in Ornamentals, 2014.

Virus Samples	TRV ¹	Potyvirus ²	TMV ³	INSV ⁴	CMV ⁵	HVX ⁶	TSWV ⁷
No. of positives	23	19	13	6	6	5	1
No. samples tested	102	51	85	71	87	19	68
% of positives	23%	37%	15%	9%	7%	26%	2%

¹Tobacco rattle virus; ²Potyvirus group; ³Tobacco mosaic virus; ⁴Impatiens necrotic spot virus; ⁵Cucumber mosaic virus; ⁶Hosta virus X; ⁷Tomato spotted wilt virus.

Basil Downy Mildew

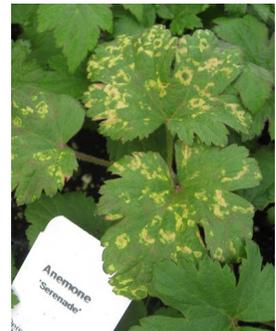
This fungal-like disease was detected on purple basil plants for sale at three Brown County retailers in June. First reported in Wisconsin in 2010, basil downy mildew can rapidly devastate basil crops and render plants unmarketable. A total of 436 plants were removed from sale.

Thousand Cankers Disease of Walnut

Two walnut tree samples were tested by the PIB Lab in 2014, neither of which was found to be positive for the *Geosmithia* fungus component of TCD. Instead, one of the seedlings was infected with *Cylindrocladium* root rot and *Botryosphaeria* canker and the other was positive for *Fusarium*.

Late Blight

The state's first case of late blight in 2014 was confirmed in a Portage County potato field on July 18. Another 13 cases were identified in July and August in Adams (two cases on potato), Brown (potato), Marinette (tomato), Milwaukee (tomato), Oconto (potato and tomato), Portage (potato), Racine (tomato), Waukesha (potato and tomato), and Waushara (potato) counties, most of which were diagnosed at UW-Madison from August 16-22. Nationally, there were 236 confirmed late blight reports from 23 states this season. This marked the sixth consecutive year that late blight developed in Wisconsin potatoes. Prior to 2009, the disease had not been observed in the state since 2002.



Tobacco rattle virus on Anemone 'Serenade'

Of the 228 ornamental samples tested for viruses at the Plant Industry Lab this year, 37% were infected with at least one virus.



Basil downy mildew

PLANT DISEASES *continued...*



Soybean stem rot caused by *Phytophthora sojae*

Phytophthora Root Rot of Soybean

The 2014 soybean root rot survey in 35 Wisconsin counties found the highest incidence of root rot caused by *Phytophthora sojae* since testing began in 2008. Plants from 46% of fields (26 of 57) sampled during the period of June 6-July 16 tested positive for this fungus-like pathogen (Figure 7). Counties in which *P. sojae* was identified were Barron, Clark, Dane, Green, Jefferson, Kenosha, Lafayette, Manitowoc, Marathon, Ozaukee, Rock, Sheboygan, St. Croix, Walworth and Winnebago, though the disease was presumably far more prevalent after the unusually cool and wet start to the growing season.

In addition to *P. sojae*, two new *Phytophthora* species were identified this year: *Phytophthora pini* and *P. sp. "personii"*. The former (found in Eau Claire County) is a pathogen of many shrubs and trees, while the latter (detected in Winnebago County) is new to science and has not yet been formally described. Neither species has previously been found on soybean and the potential impact on soybean production remains under investigation.

A fourth root rot species, *Phytophthora sansomeana*, was also found during the survey. First discovered on soybeans in Wisconsin in 2012 in Jefferson, Marathon and Sheboygan counties, *P. sansomeana* was detected this season in soybean roots from Calumet, Dunn and Eau Claire counties.

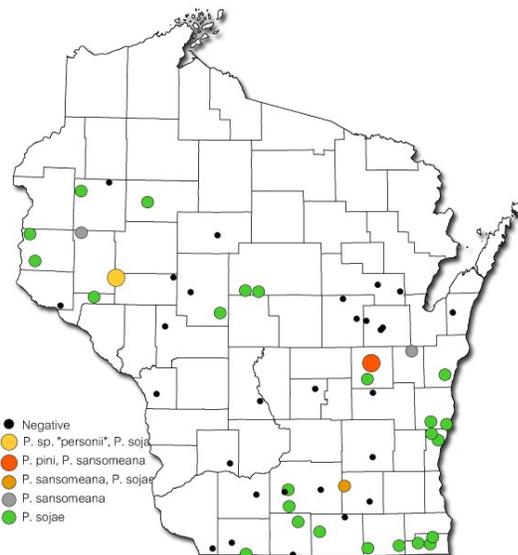


Figure 7. Soybean *Phytophthora* root rot survey, 2014.

Surveys found the incidence of soybean root rot caused by *Phytophthora sojae* since testing began in 2008.

Soybean Viruses

During the July 28-August 28 soybean virus survey, 155 fields were sampled and tested for alfalfa mosaic virus (AMV), soybean dwarf virus (SbDV) and soybean vein necrosis-associated virus (SVNaV). Twenty-four percent of fields (37 of 155) tested positive for SbDV, a substantial increase from 9% in 2013. SVNaV, a new tospovirus identified for the first time on Wisconsin soybeans in 2012, was detected in only 5% of fields (seven of 155) this year. This represents a marked reduction from 12% last season and 35% in 2012. Only 3% of the fields (five of 155) tested positive for AMV, a decrease from 5% in 2013.

Seed Field Inspection for Export Certification

Crops grown for seed export (corn, cucurbits, garlic, onions, snap beans and soybeans) 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 2014, one hundred and twenty-four seed production fields on 2,557 acres were inspected. One hundred fifty plant and soil samples were collected and tested for a range of bacterial, fungal, and viral diseases, as well as nematodes.



Soybean vein necrosis-associated virus

Seed Corn Inspection

Nine growers in eleven counties participated in seed corn field inspections for export certification in 2014. Samples from 93 fields were tested in the laboratory for the bacterial diseases Stewart's wilt

PLANT DISEASES *continued...*

and Goss's wilt. All samples were negative for Stewart's wilt, while 12% (11 of the 93) tested positive for Goss's wilt. Although Canada discontinued its disease testing requirement for imported seed corn from the U.S., other trading partners such as Argentina, Brazil, the European Union, Japan and Mexico still require testing for bacterial wilts and other diseases, including sugar cane mosaic virus, wheat streak mosaic virus, and High Plains virus. All seed corn samples were also checked for these three viruses; no virus was detected this year.

Soybean Seed Inspection

Twenty-five soybean seed fields in Columbia, Fond du Lac, Outagamie and Rock counties were inspected and tested for 10 soybean diseases: anthracnose stem blight, bacterial tan spot, bean pod mottle virus, cercospora blight, diaporthe stem canker, southern bean mosaic virus, soybean cyst nematode, tobacco ringspot virus and tomato ringspot virus. No soybean diseases of regulatory significance were found.



Goss's wilt leaf blight symptoms

NURSERY INSPECTION

Nursery Stock Inspection

The Nursery Stock Dealer and Grower Inspection 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 movement of nursery stock in trade. Program personnel inspected 452 fields of the 629 licensed nursery growers in the state this season, an increase from 435 in 2013. A total of 433 retail locations of the 1,070 licensed nursery dealers were inspected compared to 415 in the previous year.

New Pests Found in 2014

Annual nursery inspections resulted in the detection of two new pest insects in 2014: the daylily leafminer, *Ophiomyia kwansonis*, and the lily leaf beetle, *Lilloceris lili*. The daylily leafminer, while unconfirmed as a new state record, was found in July at nurseries in Dodge and Milwaukee counties. The lily leaf beetle was first observed in June in a Mosinee nursery and later reported from at least 17 Marathon County residences from July to September. The geographic distribution in the state and potential impact of these newly introduced species have yet to be determined.

Impatiens Downy Mildew

This destructive disease of impatiens was intercepted in a Wisconsin greenhouse on May 29. Laboratory analysis of 15 impatiens samples collected from the site found six (40%) to be positive for impatiens downy mildew. Five additional cases of the disease, two in Milwaukee and one each in Pierce, Rock and Washington counties, were also confirmed by the UW-Madison Plant Disease Diagnostics Clinic this season. Impatiens downy mildew has been widespread in U.S. greenhouses and landscape settings in the last three years, with Wisconsin and more than 30 other states reporting cases.

Invasive Species Rule

Nursery inspectors continued to enforce Wisconsin's Invasive Species Rule (Chapter NR 40) this season. Rule violations involving the prohibited or restricted plants blue dune lyme grass, Japanese knotweed, parrot feather, porcelain berry, Tatarian honeysuckle and yellow floating heart were documented at 13 locations this year compared to 19 in 2013.

Nursery inspectors discovered two new pests this season: the daylily leafminer and the lily leaf beetle.



Impatiens downy mildew

NURSERY INSPECTION *continued...*

Japanese Beetle

After more than 30 years of Japanese beetle trapping, DATCP discontinued its beetle survey in Wisconsin nurseries. This once exotic pest is now well established in the southern and eastern areas of the state, though its range continues to expand in the west-central and northern counties. Beetle populations were generally down across Wisconsin this season.



Japanese beetles

PHYTOSANITARY CERTIFICATION

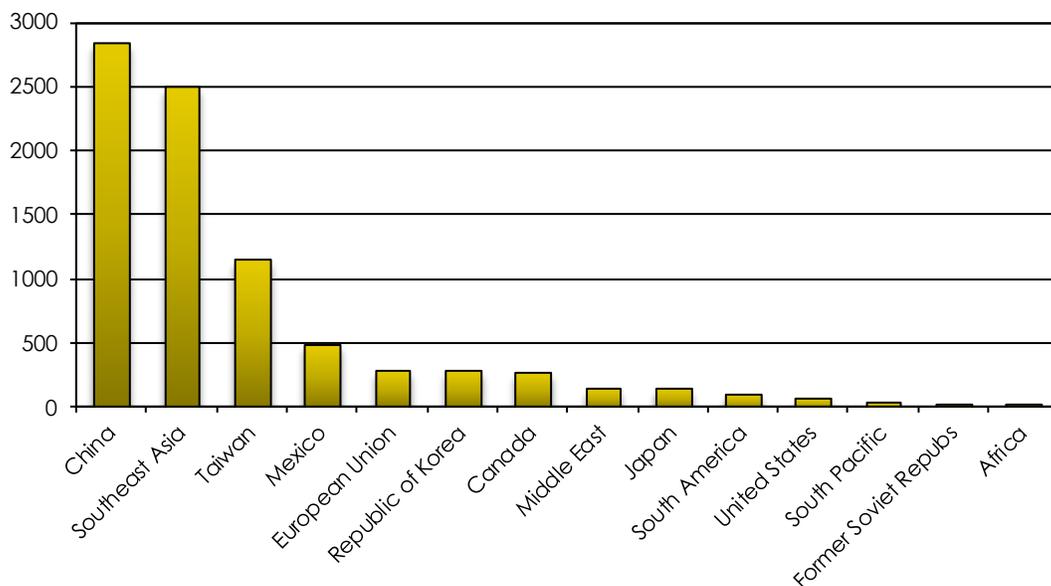
The Phytosanitary Certification Program serves Wisconsin exporters of plants and plant commodities by certifying their shipments as free from regulated pests. In 2014, demand for phytosanitary certification increased to the highest level in three years and the program was responsible for the export of over \$849,060,803 in plants and plant products. The number of certificates (phytos) issued was 8,714—a 5% increase from 8,245 in 2013. China, Southeast Asia (Indonesia, Malaysia, Philippines, Thailand, Vietnam), and Taiwan remained the destination countries for more than 77% of the phytos issued (Figure 8). Wood products accounted for the largest percentage of phytos (35%), followed by soybean grain (30%), corn grain (24%), and agricultural seed (3%). No Wisconsin commodities were rejected or destroyed at destination ports in 2014.

Annual total of 8,714 certificates were issued in 2014:

- | | |
|---|--|
| 8,375 Federal Certificates (1,745 were replacements) | 339 State Certificates |
| <ul style="list-style-type: none"> • 227 Processed Plant Product Certificates • 8,099 Phytosanitary Certificates • 49 Re-Export Certificates | <ul style="list-style-type: none"> • 65 Phytosanitary Certificates • 274 Plant Inspection Certificates |

Demand for phytos increased to the highest level in three years, with 8,714 certificates issued in 2014.

Figure 8. Total number of phytosanitary certificates issued by DATCP and country destinations.



Basswood lumber for export

PHYTOSANITARY PROGRAM *continued...*

Table 3. Estimated total value of exports, top six countries/regions.

Country	Value	Country	Value
China	\$249,821,934	Thailand	\$72,174,232
Indonesia	\$203,263,288	Viet Nam	\$58,888,495
Taiwan	\$157,331,411	South Korea	\$31,806,517



Veneer logs for export

APIARY INSPECTION

The Apiary Program monitors the apiculture industry to prevent the introduction and spread of harmful honeybee parasites and diseases. Inspectors examine migratory bee colonies entering Wisconsin from states such as Alabama, California, Florida, Georgia, Michigan, Mississippi and Texas, and those leaving, if they are destined for states which require apiary health certification. Thirty-seven apiary inspection certificates were issued for 16,055 hives departing the state this year.

Program statistics showed a substantial increase in imported colonies and nucleuses, from 28,157 in 2013 (including hives imported for pollination) to 40,337 in 2014, and a slight decrease in imported queens and packages, from 52,317 in 2013 to 52,271 in 2014. Colony losses over the winter months were estimated at 55%, a very high mortality rate that has become increasingly common in Wisconsin in the last decade. Multiple factors—pesticides, poor nutrition, inadequate forage, parasites and viruses—are thought to have caused the losses.

Apiary colony losses over the winter months were extremely high at 55%, a 10 percentage point increase from the previous year.

Table 4. Annual apiary inspection results, 2010-2014.

Year	2010	2011	2012	2013	2014
No. hives checked	950	1045	1503	1184	1152
Varroa mite	89%	85%	89%	71%	82%
Small hive beetle	3.2%	3.4%	2.9%	1.4%	2.6%
American foulbrood	1.1%	4.0%	1.3%	0.9%	0.7%
European foulbrood	1.1%	1.3%	1.1%	2.1%	0.8%
Chalkbrood	2.4%	3.5%	3.2%	1.7%	2.3%
Sacbrood	1.1%	1.4%	1.2%	1.4%	1.3%
Deformed wing virus	7.6%	3.7%	5.9%	1.0%	1.0%

The state survey of apiaries found an increase in varroa mite-infested hives from 71% in 2013 to 82% in 2014. A total of 1,152 hives were inspected this year, 398 in spring and 754 in fall. Of the hives examined during fall, small hive beetle was found in 2.6% (30 hives) from four counties: Dane, Green, Walworth and Waukesha.



Varroa mite on a honeybee

APIARY INSPECTION *continued...*

Additionally, hives were inspected for a number of other common honeybee pests and diseases, including American foulbrood, European foulbrood, chalkbrood, sacbrood, deformed wing virus, as well as exotic pests like the Africanized honeybee and *Tropilaelaps* mite. Infestation rates of varroa mite, small hive beetle and chalkbrood increased this year (Table 4). No Africanized honeybees, *Apis cerana* (Asian honeybee) or *Tropilaelaps* mites were detected during apiary inspections.



Winter injury on Colorado blue spruce

CHRISTMAS TREE INSPECTION

By licensing, inspecting and certifying Christmas trees as being reasonably free from injurious insects and diseases, the Christmas Tree Program provides a valuable service to interstate and international exporters who require certification to ship trees from Wisconsin. Growers of trees marketed locally also benefit by receiving routine inspections that identify incidence and severity levels of a wide range of non-regulated insects and diseases affecting their trees.

Annual inspections begin after the gypsy moth egg mass deposition period, usually by early September. In addition to Christmas tree fields, program staff closely examine fencerows and woodlots adjacent to fields for evidence of gypsy moth and pine shoot beetle. Growers who request plant health certification for interstate export of trees are given priority.

In 2014, the number of fields inspected decreased by 13% (Table 5). One more Christmas tree field was infested with gypsy moth (GM) than in 2013, while pine shoot beetle (PSB) was detected at two sites. Winter injury was the most prevalent abiotic disorder observed. The most common insects noted during inspections were the balsam gall midge, balsam twig aphid and white pine weevil.

Winter injury was the most common disorder of Christmas trees in 2014, with reports indicating the worst damage in many years.

Table 5. Christmas tree inspection results, 2010-2014.

Year	No. Fields Inspected	No. Fields with GM	No. Fields with PSB
2010	663	20	1
2011	689	18	3
2012	702	6	6
2013	767	10	0
2014	667	11	2



Eastern spruce gall adelgid

Top 10 Christmas tree pests found in 2014, followed by number of fields affected out of 667:

DISEASES & ABIOTICS: Winter/cold injury (248), *Rhizosphaera* on fir (123), White pine blister rust (82), deer damage (51), *Lirula* needlecast (39), broom rust (36), *Rhizosphaera* on spruce (34), pine gall rust (17), spruce needle drop (16), and disorders associated with wet soil (11).

INSECTS: Balsam gall midge (196), balsam twig aphid (112), white pine weevil (72), spruce spider mite (26), Zimmerman pine moth (19), Eastern spruce gall adelgid (18), pine needle scale (13), grasshoppers (7), root collar weevil (5), and ants (4).

POTATO ROT NEMATODE

During the 62-year period since the potato rot nematode (PRN) was first identified in Wisconsin, the overall incidence of this pest has decreased significantly. From 1953-1963, a total of 68 infested fields were detected, but only 41 have been found in the last 52 years. Program specialists inspect an average of 13 fields per year and detect about one infested field annually. Today, there are a total of 3,049 acres with a history of PRN infestation (Table 6). Of these acres, 95% are located in Langlade County, the largest seed potato production area in the state.

Six potato fields totaling 242 acres were inspected in 2014. One 56-acre field previously infested with PRN was found to be positive and remained under quarantine. Another two fields totaling 77 acres, also with a history of PRN infestation, were found to be negative and were released for table stock. These fields will be eligible to produce certified seed potatoes if next year's inspection finds no evidence of PRN. The other three fields totaling 109 acres were new to seed potato production and required preliminary inspection. All three were negative for PRN.

The Potato Rot Nematode Inspection and Quarantine Program has played a major role in limiting the spread of PRN since 1953. Due to the program's effectiveness, this pest has never been intercepted in shipments of commercially grown potatoes or seed potatoes from Wisconsin.



Potato harvesting

Table 6. History of potato rot nematode in Wisconsin and current status, 1953-2014.

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	191	3
Langlade	Infested	372.8	17
Langlade	Released not used for potato	197.77	9
Langlade	Released/certified seed	1575.94	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
TOTAL		3048.95	109

In Wisconsin, there are a total of 3,049 potato field acres with a history of potato rot nematode infestation.



Potato rot nematode tuber symptoms

SEED CONTROL



Lawn grass seed mixture

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.

Three hundred and forty-one samples from 88 (12%) labelers were collected by DATCP inspectors in 2014, a minor decrease from 2013. A total of 207 (29%) of the state's 730 licensed labelers were inspected (Table 7). Seed labelers with poor compliance records or an increasing number of violations, as well as those not sampled in the last two years, were targeted for sampling. The annual violation rate was 5.3%, which represents a 2.7 percentage point decrease from last season and is a new record low. Of these violations, two were rated as *technical*, 12 were *minor*, and four were *serious*.

All licensed labelers in the state are sampled or inspected on a three-year rotation. Labelers must register annually with DATCP. The program currently inspects an average of 31% of the 730 labelers each year and samples approximately 14%.

Table 7. Number of seed labelers inspected, samples collected and violation rates, 2005-2014.

Year	Labelers	Samples	Violations	% Violation	% Labelers Inspected	% Labelers Sampled
2005	691	340	44	12.9%	36%	15%
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%

SEED COMPLIANCE ACTIONS TAKEN IN 2014:

- 18 violations were issued
- 11 seed lots were relabeled to meet compliance standards
- 4 lots were removed from sale by the labeler
- 3 lots were returned to the labeler

