Department of Agriculture, Trade & Consumer Protection • Bureau of Plant Industry

WISCONSIN DATCP

REPORT TO THE CENTRAL PLANT BOARD

DEPARTMENT OF AGRICULTURE, TRADE & CONSUMER PROTECTION
DIVISION OF AGRICULTURAL RESOURCE MANAGEMENT
BUREAU OF PLANT INDUSTRY
2811 AGRICULTURE DRIVE MADISON, WI 53708-8911

2013

2013

EXOTIC PEST UPDATE

Spotted Wing Drosophila

This newly introduced, invasive pest of Asian origin emerged in record numbers last fall. Infestations were confirmed in 13 Wisconsin counties and suspected in another seven (Figure 1). The current known distribution of spotted wing drosophila (SWD) in the state includes the counties of Bayfield, Brown, Crawford, Dane, Door, Fond du Lac, Kewaunee, Manitowoc, Marinette, Monroe, Pierce, Racine, Vernon, Winnebago and Wood, for a total of 15 confirmed counties since it was first identified in Wisconsin in 2010. In the years 2010 and 2011, the detections were the result of surveys in fruit orchards. By contrast, nearly all of the new cases in 2012 were based on reports from fruit growers who observed larvae in their blackberry and raspberry plantings. The abundance of SWD last season is thought to have been influenced by southerly spring weather patterns that carried large numbers of flies into the state.

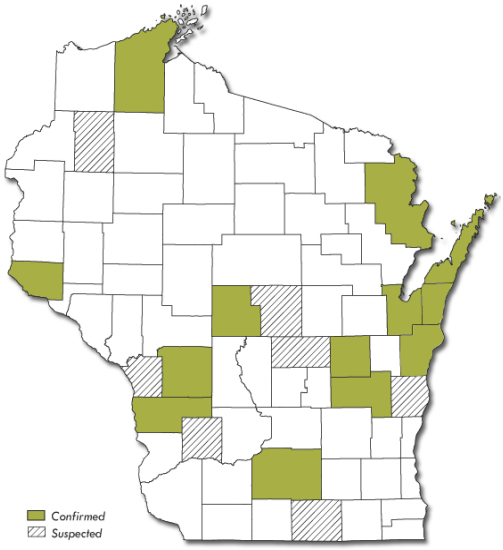


Figure 1. Spotted wing drosophila detections and unconfirmed reports, 2012.

Brown Marmorated Stink Bug

Established populations of the invasive brown marmorated stink bug (BMSB) are now suspected in Dane and Jefferson counties. A single nymph was collected on October 19, 2012 from the siding of a West Madison home and an adult specimen was found "at lights" in Madison on July 14. Another adult was collected from a car windshield in Jefferson County on September 28. These finds, in combination with earlier detections at two Middleton and Fort Atkinson residences last spring, strongly suggest that the invasive bug is established at low levels in south-central Wisconsin. The BMSB has been found indoors or in association with shipping materials on at least 10 occasions since 2010, but to date has not been detected in any agricultural setting in Wisconsin.

Grape Pests

Results of an exotic grape pest survey in 13 Wisconsin vineyards were negative. A total of 104 traps (two per pest/eight per site) were placed at sites in Brown, Dane, Door, Grant, Kewaunee, Manitowoc and Vernon counties to detect four harmful fruit moths: European grape berry moth, European grapevine moth, light brown apple moth and silver Y moth. Each of these target species poses a significant threat to the state's emerging grape industry in the form of fruit damage and quarantine regulations. In addition, Wisconsin's climate is very suitable for their establishment if an introduction were to occur via fruit and nursery stock shipments from other infested US states. Traps were placed in July and checked periodically through September. None of the target pests were found.

Citron Bug

A new state record was established in Wood County on July 17 when a single adult specimen was collected from squash in a Wisconsin Rapids home garden. This leaf-footed bug is a pest of citrus fruits in Florida that causes premature color break and fruit drop. Its feeding injury also provides access for fungal diseases and insects. The recent detection is not expected to have economic implications for Wisconsin growers since winter survival is unlikely and its preferred host is citrus.

INSIDE THIS REPORT

HIGHLIGHTS OF 2012

EMERALD ASH BORER

Emerald ash borer adult and D-shaped exit hole

Emerald ash borer (EAB) was first identified in the state on August 1, 2008 and now occurs in portions of Brown, Crawford, Kenosha, La Crosse, Milwaukee, Ozaukee, Racine, Rock, Trempealeau, Vernon, Walworth, Washington and Waukesha counties. Infestations were detected in four new counties in 2012. A quarantine remains in effect in the 13 counties listed, and in the counties of Fond du Lac and Sheboygan, which border infested areas.

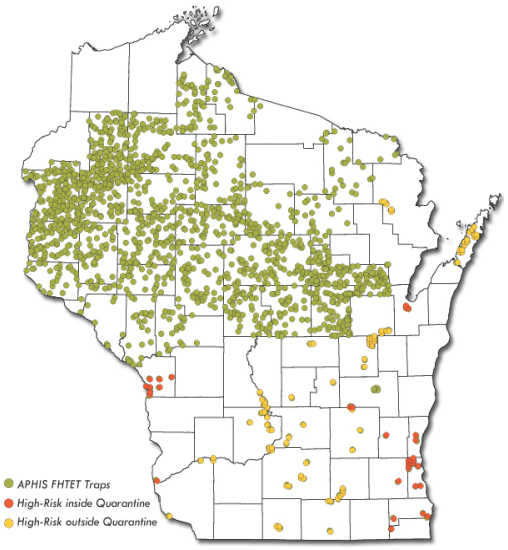


Figure 2. Emerald ash borer trapping survey, 2012.

The Department of Agriculture, Trade and Consumer Protection (DATCP) conducted EAB detection work in 59 of the 72 counties in the state last year. The trapping survey included a total of 1,649 panel traps set primarily in the northern half of Wisconsin. Locations of the traps were determined using the FTHET/APHIS model and refined with trapping data from previous EAB surveys. Panel traps were also placed by DATCP at high-risk sites both inside and outside of the quarantined area in southern Wisconsin, while double-decker traps were set by Department of Natural Resources (DNR) specialists in selected state parks and forests (Figure 2).

Emerald ash borer was detected in four new counties in 2012 and now occurs in parts of 13 Wisconsin counties.

The 2012 detection survey resulted in the capture of 11 beetles on one DATCP trap in Kenosha County. Another eight beetles were collected on five DNR traps at state parks in Kenosha, Trempealeau and Walworth counties. All other traps were negative, although several infested trees were discovered in Brown, Rock, Walworth and Waukesha counties. Consequently, Rock, Trempealeau and Walworth counties were added to the EAB quarantine, while Brown, Kenosha and Waukesha have been quarantined since 2009.

The EAB program has set 25,850 panel traps, peeled 2,405 ash trees, and inspected over 500 sites for EAB to date. Cumulative results over the last six years include 23 positive traps and 128 sites with infested ash trees.

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 results indicate population densities close to the leading edge of the gypsy moth's advancing front and are used to prioritize future treatment sites in western Wisconsin.

Slow-the-Spread Treatments

The Slow-the-Spread (STS) Program's 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. In 2012, the program treated 193,924 acres (64 sites) in 22 counties. Aerial treatments of Btk totaled 45,284 acres, Gypchek applications totaled 3,606 acres, and mating disruption totaled 145,034 acres. Applications began as early as April 26 following an unusually warm March and were completed by

GYPSY MOTH *continued...*

June 28. The average rate of spread across Wisconsin in 2012 was 6.44 km, a marked decrease from 10.64 km in 2011 (Table 1). The STS Program has successfully reduced the rate of natural spread in the last decade to an average of 12 km per year, a 57% reduction from 28 km in the years prior to its implementation in 2000.

Gypsy moth spray plane

Table 1. Rate of gypsy moth spread in Wisconsin (km), 2008-2012.

Year	Northern WI	Central WI	Southern WI	State Average
2008	68.46	46.48	38.82	51.25
2009	-15.71	-26.69	-15.27	-19.01
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

Trapping Results

Analysis of trapping program data revealed no significant change in the average number of moths per trap from 2011 to 2012. The annual survey registered an average of 9.5 moths per trap compared to 9.4 last year. State moth counts were 173,588 in 18,293 pheromone traps in 2012 and 233,990 in 25,001 traps in 2011. The highest counts were reported from Ashland, Bayfield, Jackson, Clark and Wood counties, while none of the 52 counties surveyed this summer registered zero moths. Most of the 18,293 pheromone traps were distributed throughout western Wisconsin to identify emerging populations and to measure the advance of the gypsy moth.

The gypsy moth quarantine expanded last year and currently includes 48 eastern and central Wisconsin counties.

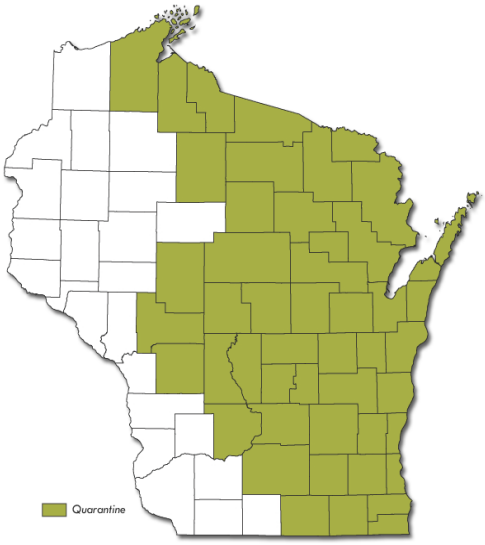


Figure 3. Gypsy moth quarantine, 2012.

Gypsy Moth Quarantine

The counties of Ashland, Bayfield and Clark, which now have established or breeding populations of gypsy moths, were added to the existing gypsy moth quarantine in 2012. The Wisconsin quarantine currently includes 48 counties in the eastern and central areas of the state (Figure 3).

Defoliation

Larvae defoliated 14,500 acres of aspen and oak in northern Bayfield County and a few large roadside oaks in Marinette County in 2012, according to DNR aerial surveys. Although the number of forested acres defoliated by gypsy moth larvae increased from 2011 when surveys found no visible damage, the total acreage was still very low in comparison to the defoliation that occurred in 2010 when an unprecedented 346,749 acres were impacted in northeastern, central and south-central Wisconsin. Egg mass surveys conducted by the DATCP Gypsy Moth Program last fall indicate higher larval populations and heavy defoliation should be expected in parts of the Bayfield Peninsula in far northern Wisconsin next season.

Gypsy moth defoliation

NURSERY INSPECTION

Japanese beetle

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 421 fields of the 653 licensed nursery growers in the state last season, an increase from 396 in 2011. A total of 399 of the 1,059 licensed nursery dealers were inspected compared to 442 in the previous year. No new or exotic pests were found in association with Wisconsin nursery stock in 2012.

Japanese Beetle

After many successive years of high trap counts, the Japanese beetle trapping program was revised in 2012 and efforts were concentrated in nurseries with low densities of 20 or fewer beetles per trap (based on three years of trap data). Last year's survey included 99 traps and yielded 16,292 beetles, or 165 per trap. High counts of 200 or more beetles per trap were registered in Dodge, Jefferson, Kenosha, Manitowoc, Monroe, Ozaukee and Waukesha counties, moderate counts of 50-199 per trap were found in Dane, Jackson, Rock and Washington counties, and 13 other counties averaged fewer than 50 per trap. The survey average of 165 beetles per trap represents a 30% decrease from 2011 when the average was 236 per trap and suggests beetle populations were generally lower in 2012.

European Pine Shoot Moth

European pine shoot moth was detected in two of eight counties in which traps were set in 2012.

State nursery inspectors conducted a European pine shoot moth (EPSM) trapping survey for the first time last season, targeting nursery stock and Christmas tree growers who ship pines to California, Hawaii and Montana where external quarantines are enforced against EPSM. Approximately 32 moths were captured at two sites in Jackson and Rock counties. Surveys in Adams, Clark, Columbia, Marquette, Racine and Shawano counties were negative.

Rejected Nursery Stock

Ornamental plants and trees infested with regulated insects or diseases or that fail to meet pest cleanliness, labeling and quality standards are commonly found during routine nursery inspections. Such plants cannot be offered for sale in Wisconsin. Included in this category in 2012 were cherry trees with black knot, assorted herbaceous perennials with viruses, coneflower with aster yellows, speedwell with foliar nematodes and non-viable stock. In addition, a variety of trees and shrubs were rejected due to scale insect infestation and wood-boring insect damage.

PHYTOSANITARY CERTIFICATION

Soybean grain

The Phytosanitary Certification Program serves Wisconsin exporters of plants and plant commodities by certifying their shipments as free from regulated pests. Last year the program was responsible for the export of over $565,080,018 in plants and plant products. Demand for phytosanitary certification declined in 2012, but remained comparatively high. The number of certificates (phytos) issued was 6,779, a 15% decrease from 8,010 in 2011. Southeast Asia (Indonesia, Malaysia, Philippines, Thailand, Vietnam), China and Taiwan were the destination countries for more than 66% of the phytos issued (Figure 4). Soybean grain accounted for the largest percentages of phytos (29%), followed by kiln dried lumber (22%), corn grain (8%), and nursery plants (8%). No Wisconsin commodities were rejected or destroyed at destination ports in 2012, an indication of the accuracy and efficiency of the Certification Program.

PHYTOSANITARY CERTIFICATION *continued...*

Annual summary of certificates issued

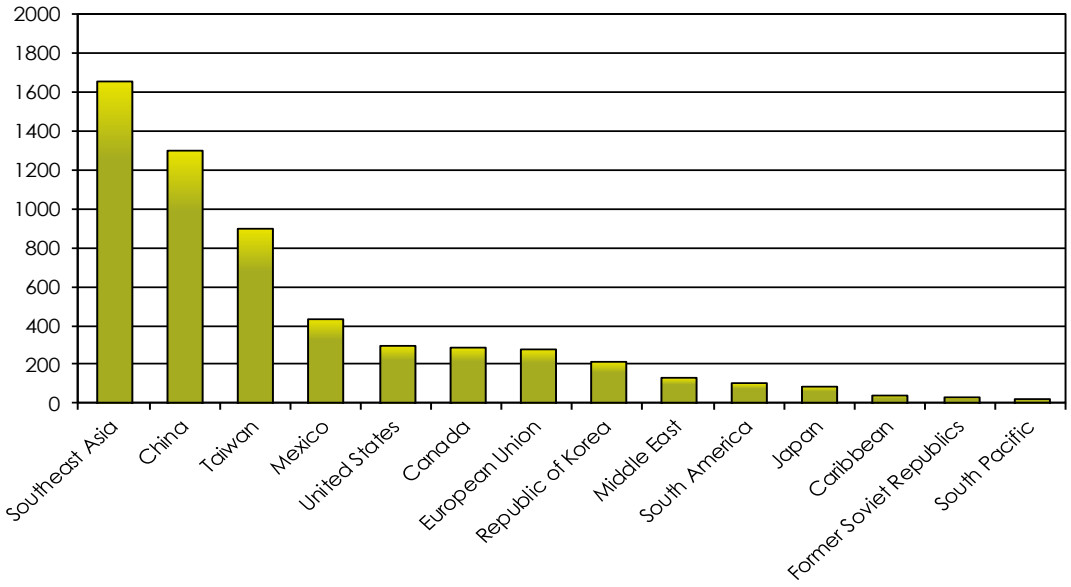
A total of 6,779 certificates were issued in 2012:

6,480 Federal Certificates (includes 943 replacements)
- 277 Processed Plant Product Certificates
- 5,230 Phytosanitary Certificates
- 30 Re Export Certificates

299 State Certificates (11 replacements)
- 59 Phytosanitary Certificates
- 229 Plant Inspection Certificates

Soybean harvest

Figure 4. Total number of phytosanitary certificates issued by DATCP and country destinations.



Southeast Asia, China and Taiwan were the destination countries for more than 66% of the phytos issued last year.

Table 2. Estimated total value of exports, top six countries/regions.

Country	*Value*	*Country*	*Value*
Taiwan	$148,519,656	China	$78,969,313
Indonesia	$111,778,577	Canada	$13,747,396
Thailand	$95,290,543	Philippines	$5,272,714

FIELD CROP INSECT SURVEY

Alfalfa weevil

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

FIELD CROP INSECT SURVEY *continued...*

European corn borer moth

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.

Corn Rootworm Beetle

The annual survey conducted in August found a minor decrease in the state average number of beetles per plant. Population reductions were charted in five of the nine crop reporting districts, while increases occurred in the northern and southeastern areas. The state average of 0.6 beetle per plant compares to 0.7 last season and a 10-year average of 0.9 per plant. District counts were as follows: northwest 0.5, north-central 0.3, northeast 0.6, west-central 0.4, central 0.5, east-central 0.4, southwest 0.8, south-central 0.9, and southeast 0.9. Beetle counts in all three northern districts increased markedly from very low 2011 levels, but remained below the economic threshold of 0.75 beetle per plant. Economic populations were noted in 25% of the 229 fields surveyed (Figure 5).

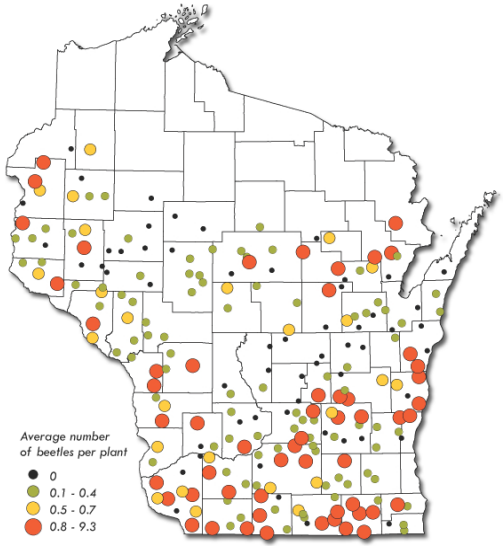


Figure 5. Corn rootworm beetle survey, 2012.

The 71st annual European corn borer survey found the lowest state average fall larval population since 1942.

Results of the survey indicate a high potential for larval root injury to non-Bt, continuous corn in southern Wisconsin next season and a low to moderate risk elsewhere. Corn producers in the south were advised to consider crop rotation, planting a Bt-rootworm hybrid or another form of rootworm management in 2013.

European Corn Borer

Larval populations declined to the lowest level in the history of European corn borer surveys in Wisconsin. The seventy-first annual fall abundance survey in October found a state average of only 0.03 borer per plant, the lowest since 1942. Populations decreased from 2011 in eight of the nine crop reporting districts, the exception being the southwest where the average remained unchanged at 0.03 borer per plant. The highest district average of only 0.09 borer per plant was noted in the west-central area.

Research has demonstrated that the historically low European corn borer populations documented in Wisconsin and the Midwest during the last several years are directly associated with increasing, widespread Bt corn use. Last year's already low population was likely further reduced by the summer drought.

Western bean cutworm larva feeding in corn ear

Western Bean Cutworm

According to the 2012 trapping program results, the moth flight peaked 2-3 weeks earlier and was slightly smaller than that of 2011. The average number of moths per trap was 25, a minor decrease from 28 per trap last year. The 2012 state count of 3,290 moths compares to 4,895 in 2011, 10,807 in 2010 and 4,928 in 2009. Infestations resulting from the flight were minimal again last season. Most larvae were fully developed and had entered the pre-pupal overwintering stage by mid-August.

FIELD CROP INSECT SURVEY *continued...*

Corn Earworm

The primary flight began by June 27 and continued through mid-September. Moth collections fluctuated in July and August and peaked from August 24-September 5, with weekly counts ranging from 809-2,545 moths per trap at the Fond du Lac County monitoring locations. The twelve-week migration yielded a cumulative total of 10,656 moths at 15 sites, which is a 57% increase over the 4,571 moths at 15 sites in 2011. Late-season flights were much larger than in the previous year, although most of the moths arrived after sweet corn was well past the critical silking stage. Larval damage to corn was generally localized and economically insignificant in 2012.

Soybean field damaged by variegated cutworms

Variegated Cutworm

An unprecedented influx of migrants arrived in early May and began depositing eggs on the windows, eaves and siding of homes in northern Wisconsin. Alfalfa, corn, potatoes and soybeans started to develop larval infestations during the first week of June. Damage intensified from June 14-21, with reports of "uncountable" numbers of larvae appearing in soybeans near Ripon in Fond du Lac County and several Sauk County fields that had been "chewed down to the stems". Areas of highest concentration were in the east-central and central districts, including Fond du Lac, Green Lake and Marquette counties. Economic infestations were also noted in Adams, Barron, Clark, Columbia, Dane, Dodge, Grant, Manitowoc, Marathon, Rusk, Sauk, Waupaca, Waushara and Winnebago counties. After what became the state's largest variegated cutworm outbreak on record, chemical treatment and pupation resolved much of the problem by early July.

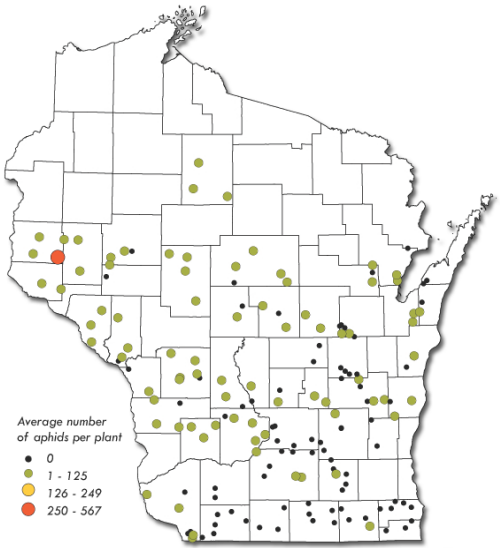


Figure 6. Soybean aphid survey, 2012.

Two-spotted spider mites were the leading arthropod threat to Wisconsin soybean production in 2012.

Soybean Aphid

The twelfth annual survey documented the lowest densities in the history of soybean aphid in Wisconsin. Examination of 164 soybean fields, once in July and again in August, found an exceptionally low state average of only three aphids per plant during the first half of the survey and a count of seven per plant in August. The previous lowest state average was 11 aphids per plant in 2004. An economic population of 568 aphids per plant was found at one St. Croix County site, while all other surveyed fields contained fewer than 58 aphids per plant. (Figure 6). Probable explanations for the scarcity of aphids this year include intense heat and extensive chemical treatment of fields for two-spotted spider mites, which also reduced aphid numbers.

Two-Spotted Spider Mite

Prolonged extreme heat and rainfall shortages contributed to widespread spider mite problems last season. Numerous fields showing bronzed, stippled leaves, and in severe cases, leaf drop, were noted in all parts of the state in July and August. The problem was most pervasive in southern and central Wisconsin, areas most impacted by last summer's historic drought. A large percentage of soybean acres required one or more treatments for mite control before infestations diminished in late August due to chemical intervention and intermittent rainy weather. This pest was the leading arthropod threat to Wisconsin soybean production in 2012.

Soybean leaf stippling caused by two-spotted spider mites

PLANT DISEASE SURVEY AND DIAGNOSIS

Soybean roots infected with Phytophthora sansomeana and Pythium

The Plant Industry Laboratory provides plant disease diagnostic services to the Pest Survey Program, the Nursery and Christmas Tree Inspection Programs, as well as 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 offers testing for phytosanitary certification necessary for domestic and international export of certain plants.

In 2012, laboratory pathologists diagnosed disorders on 317 nursery stock and Christmas tree samples and screened 436 samples for pests of field crops. A total of 753 plant and soil samples were processed last year, including 96 samples for export certification.

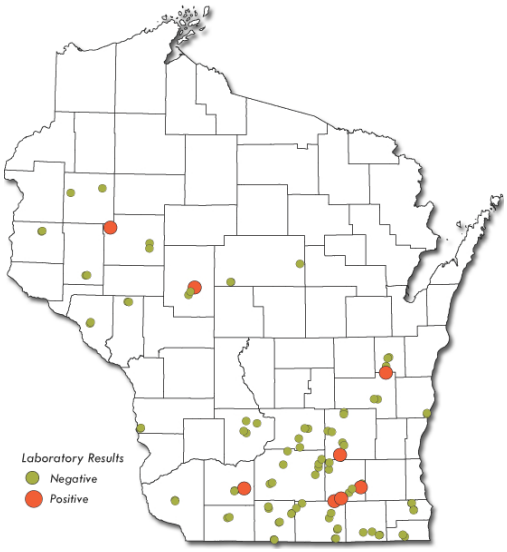


Figure 7. Phytophthora root rot of soybean seedlings survey, 2012.

Phytophthora Root Rot

DATCP plant pathologists surveyed soybean fields for seedling root rot diseases from May 29-July 2. Of the 49 root samples collected during the survey, eight (16%) tested positive for *Phytophthora sojae*, a common cause of soybean root and stem rot. A second, newly described Phytophthora species was identified from three samples (see paragraph below). All root tissues also tested positive for *Pythium*. The 2012 *P. sojae* incidence rate of 16% compares to 4% last year, 27% in 2010 and 18% in 2009.

Phytophthora sansomeana, a newly described species, was identified for the first time in Wisconsin soybean fields.

First Report of Phytophthora sansomeana

During the early-season soybean survey, the root rot pathogen, *Phytophthora sansomeana,* was found infecting soybean roots in three fields in Jefferson, Marathon and Sheboygan counties. *Phytophthora sansomeana* is a newly described species that has been reported on corn in Ohio, Douglas fir in Oregon, soybean in Indiana, and weeds such as wild carrot, white clover and white cockle in New York. In 2011, it was isolated from Fraser firs grown on Wisconsin Christmas tree farms. To our knowledge, this is the first report of soybean root rot caused by *P. sansomeana* in Wisconsin. Its potential impact on soybean production remains to be determined.

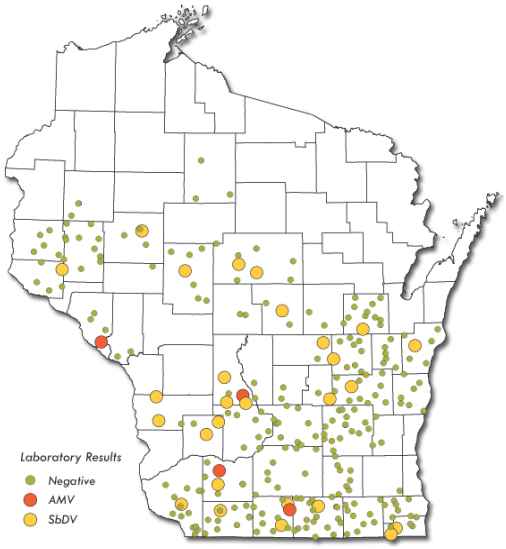


Figure 8. Soybean virus survey results, 2012.

Soybean mosaic virus symptoms on soybean foliage

Soybean Viruses

Illustrated in the adjacent map (Figure 8) are the locations of 274 soybean fields sampled and tested for soybean dwarf virus (SbDV) and alfalfa mosaic virus (AMV) last season. Twenty-seven fields (10%) were infected with SbDV in 2012 compared to five (4%) in 2011. Alfalfa mosaic virus was found in four fields (2%), a decrease from 16 fields (12%) the year before. The reason for the in-

PLANT DISEASE SURVEY *continued...*

crease in SbDV is unclear, especially since populations of the soybean aphid, a known vector of the virus, were extremely low in 2012.

Soybean vein necrosis-associated virus

Soybean Vein Necrosis-Associated Virus

The UW-Madison and the DATCP Plant Industry Lab confirmed in October the first detection in Wisconsin of soybean vein necrosis-associated virus (SVNaV), a tospovirus potentially transmitted by soybean thrips. The virus was isolated from soybean leaf samples collected in September. Symptoms include yellowing and browning of the leaf veins and leaves. SVNaV was first reported from Tennessee in 2008 and subsequently has been detected in Arkansas, Kentucky, Missouri, Wisconsin and Ontario, Canada. Additional research is needed to determine if SVNaV is a yield-reducing threat to the state's soybean industry.

Corn Wilt Diseases

The incidence of Goss's wilt in Wisconsin seed corn fields decreased significantly last season. After two consecutive years of elevated disease rates, only three of 57 (5%) corn leaf samples tested positive in 2012. Disease incidences were 34% and 62%, respectively, in 2011 and 2010. The hot, dry weather of July appears to have reduced its occurrence, while in the preceding two years, heavy precipitation, frequent storms and extensive wind damage favored its development. Corn leaf samples were also tested for other diseases of export significance, including Stewart's wilt and wheat streak mosaic virus. Results for both diseases were negative.

Late Blight

Potato fields infected with late blight were confirmed in Adams, Barron, Marathon, Oneida, Portage and Waushara counties in 2012. The earliest infections originated by July 31 from aerially dispersed spores and a large portion of the state remained at risk for the disease throughout August. Tomatoes infected with late blight were reported from the counties listed above, as well as Eau Claire, Rusk, Sauk and Sheboygan (Figure 9). Monitoring and treatment of susceptible tomato and potato crops continued through final harvest in September.

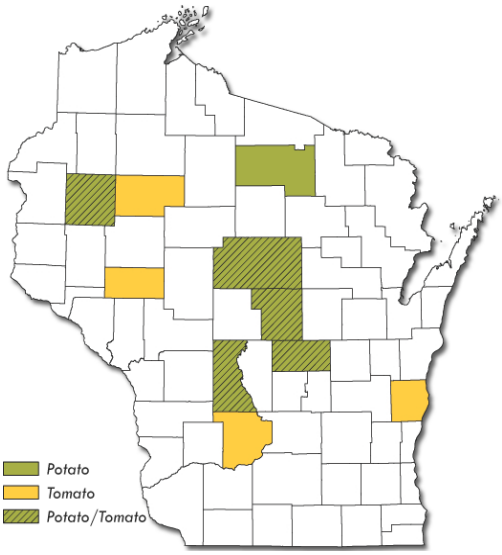


Figure 9. Late blight reports, 2012. DATCP and UW-Madison data.

The first case of soybean vein necrosis-associated virus (SVNaV) on Wisconsin soybeans was documented in 2012.

Virus Survey of Ornamentals

A spring survey of ornamentals conducted at 29 Wisconsin greenhouse, nursery and retailer locations found a wide range of plants to be infected with viruses. During the period of March 2-June 21, 110 plants displaying virus symptoms were collected and diagnosed at the DATCP Plant Industry Laboratory. Samples with unusual virus-like symptoms were forwarded to the University of Minnesota Plant Disease Diagnostic Clinic for further testing. Of the 110 plants tested, 47 (43%) were infected with one or more viruses.

Impatiens necrotic spot virus on begonia

The most frequently detected virus was tobacco rattle virus (TRV), found in 27 of 90 (30%) plant samples. Nearly all bleeding heart (93%) and barrenwort (100%) samples submitted for testing were

PLANT DISEASE SURVEY *continued...*

Phytophthora root rot symptoms on Christmas trees

infected with TRV. Several other viruses were also detected, namely cucumber mosaic virus, diagnosed in 10 of 103 (10%) samples, and hosta virus X, found in seven of 14 (50%) samples. Another eight ornamental hosts tested by virologists at the UMN were positive for virus particles, including a 'Black Jack' fig grown in California which was infected with fig mosaic virus and a clematis plant with a tombusvirus.

Most plant viruses are readily transmitted through contaminated pruning and propagating tools that move sap from one plant to another, as well as by natural vectors such as aphids, thrips and nematodes. To limit the spread of these destructive diseases to garden plants and crops, DATCP requires all virus-infected nursery stock to be removed from sale and destroyed.

New Phytophthora Root Rots of Christmas Trees

A survey for Phytophthora root rot in Christmas tree plantings was instituted after the 2010 detection of a new Phytophthora species, *Phytophthora* sp. '*kelmania*', in two Wisconsin counties. The sampling protocol was to collect conifers with symptoms of decline during standard Christmas tree field inspections in September and October. A total of 689 fields were inspected in fall of 2012; 58 tree samples from 37 fields (in 18 counties) were collected and analyzed for Phytophthora root rot. Fraser firs from 15 fields were found to be positive (Figure 10).

Four Phytophthora root rot species were detected during a survey of Wisconsin Christmas tree fields.

Four distinct Phytophthora species were identified from the samples: *Phytophthora cactorum*, *P. citricola*, *P. europaea* and *P. sansomeana*. The latter two species are new to science and were first found in Wisconsin on Frasier fir in 2011. In addition to Phytophtora, Armillaria root rot was also a cause of tree mortality in some of the fields. In the Central Sands area of the state, most tree death was attributed to last summer's drought.

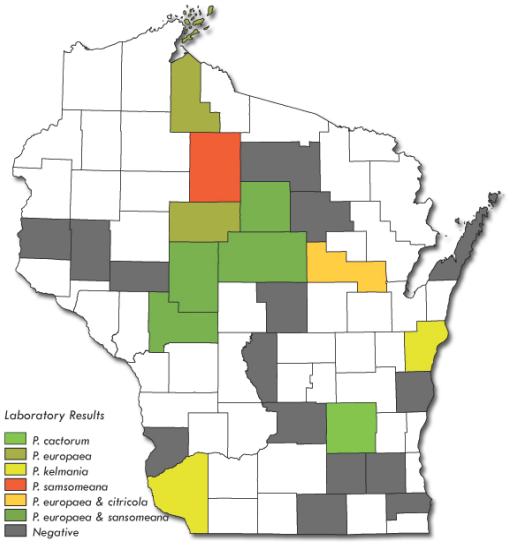


Figure 10. Phytophthora root rot of Christmas trees survey, 2012.

Members of the genus *Phytophthora* are responsible for a vast range of destructive diseases and are thought to be spread by the plant trade.

Soybean Cyst Nematode

Soil from 37 soybean fields was sampled in 2012 for soybean cyst nematode (SCN), the greatest yield -reducing soybean pest in the U.S. No new cases of SCN were confirmed. The total number of Wisconsin counties with at least one SCN-infested field is 50. Soybean acreage in the counties where SCN has been detected comprises 92% of the soybean crop in the state.

Boxwood blight

Boxwood Blight

This new disease of boxwoods, caused by the fungal pathogen, *Cylindrocladium pseudo-naviculatum*, was not diagnosed from any boxwood sample submitted to the Plant Industry Lab for testing last season. Instead, some of the samples showing tip dieback were found to have Phoma blight, Volutella blight

PLANT DISEASE SURVEY *continued...*

or winter injury. Symptoms of boxwood blight include brownish leaf spots, distinctive black stem lesions, rapid defoliation and severe dieback. This fungal disease has not been confirmed in Wisconsin to date.

Beekeeper checking a frame of honey bees

APIARY PROGRAM

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.

Program statistics showed an increase in imported colonies and nucleuses, from 30,517 in 2011 to 31,752 in 2012 (including hives imported for pollination), and in imported queens and packages, from 25,981 in 2011 to 31,599 in 2012. Colony losses over the winter months were estimated at 23%, the lowest since 2001. The low winter mortality reported by Wisconsin beekeepers last year was likely influenced by the mild winter of 2011-2012 and abnormally warm early spring temperatures.

The statewide survey of apiaries found an increase in varroa mite-infested hives, from 85% in 2011 to 89% in 2012. A total of 1,503 hives were inspected, 757 in spring and 746 in fall. Of the hives examined during fall, small hive beetle was found in 2.9% (44 hives) from eight counties: Brown, Chippewa, Crawford, Milwaukee, Monroe, Racine, Sheboygan and Waukesha.

Apiary colony losses over the winter months were estimated at 23%, the lowest average since 2001.

Additionally, hives were inspected for a number of other honeybee pests and diseases, including American foulbrood, European foulbrood (EFB), chalkbrood, sacbrood, deformed wing virus (DWV), as well as Africanized honeybees and Tropilaelaps mites. American foulbrood was found in 1.3% of hives, EFB was found in 1.1%, chalkbrood was found in 3.2%, sacbrood was found in 1.2%, and DWV was found in 5.9% (Table 3). No Africanized honeybees or Tropilaelaps mites were detected during standard apiary inspections.

Table 3. Annual apiary inspection results, 2008-2012.

Year	*2008*	*2009*	*2010*	*2011*	*2012*
No. hives checked	1288	1334	950	1045	1503
Varroa mite	82%	92%	89%	85%	89%
Small hive beetle	0.6%	2.6%	3.2%	3.4%	2.9%
American foulbrood	2.2%	4.5%	1.1%	4.0%	1.3%
European foulbrood	0.5%	0.5%	1.1%	1.3%	1.1%
Chalkbrood	6.4%	5.6%	2.4%	3.5%	3.2%
Sacbrood	2.7%	1.6%	1.1%	1.4%	1.2%
Deformed wing virus	4.9%	8.3%	7.6%	3.7%	5.9%

Small hive beetles on frame of honey

CHRISTMAS TREE INSPECTION

Eastern spruce gall adelgid

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 2012, the number of fields inspected increased by 2% (Table 4). Fewer Christmas tree fields were infested with gypsy moth (GM) than in 2011, while pine shoot beetle (PSB) was detected at six sites compared to three in the previous year. Drought damage, frost injury and white pine blister rust were the most prevalent abiotic disorders and diseases observed. The most common insects noted during inspections were balsam twig aphid, balsam gall midge and white pine weevil.

Drought damage and frost injury were the most common disorders affecting Wisconsin Christmas trees last year.

Table 4. Christmas tree inspection results, 2008-2012.

Year	No. Fields Inspected	No. Fields with GM	No. Fields with PSB
2008	736	39	0
2009	617	26	2
2010	663	20	1
2011	689	18	3
2012	702	6	6

Top 10 Christmas tree pests found in 2012 (followed by number of fields affected out of 702):

DISEASES & ABIOTICS: Drought damage (97), frost injury (72), white pine blister rust (61), broom rust (59), pine gall rust (40), Rhizosphaera on spruce (27), deer damage (22), Rhizosphaera on fir (16), Lirula needle cast (16), and various root rots (13).

INSECTS: Balsam twig aphid (169), balsam gall midge (166), white pine weevil (95), Eastern spruce gall adelgid (42), Zimmerman pine moth (24), ants (15), root collar weevil (10), loopers (10), aphids and sooty mold (10), and pales weevil (8).

Potato rot nematode tuber symptoms

POTATO ROT NEMATODE

During the 58-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 49 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.

POTATO ROT NEMATODE *continued...*

Of these acres, 95% are located in Langlade County, the largest seed potato production area in the state.

Four potato fields totaling 139 acres were inspected in 2012. All four were entering seed potato production for the first time and required inspection as part of the certification process. The fields were declared to be apparently free from PRN after the harvest inspections found no evidence of infestation.

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.

Spotted knapweed

BIOLOGICAL CONTROL & WEEDS

Biological Control Efforts

Biological agents for control of spotted knapweed and leafy spurge were introduced at 179 new sites last year. An estimated 68,800 spotted knapweed weevils (*Larinus* spp.) were released in July at 172 sites in Barron, Bayfield, Chippewa, Clark, Door, Douglas, Forest, Jackson, Marathon, Oneida, Portage, Vilas, Washburn and Waupaca counties. Another 4,000 leafy spurge agents were introduced at seven locations in Douglas County. Studies near previous release sites indicate that the spotted knapweed weevils *Larinus minutus* and *L. obstusus* have successfully established and are rapidly spreading. In one instance, the beetles were collected nearly nine miles away from the original release site where they had been introduced just three years earlier.

Spotted knapweed biocontrol agents (Larinus spp.) have established and are spreading at several sites across the state.

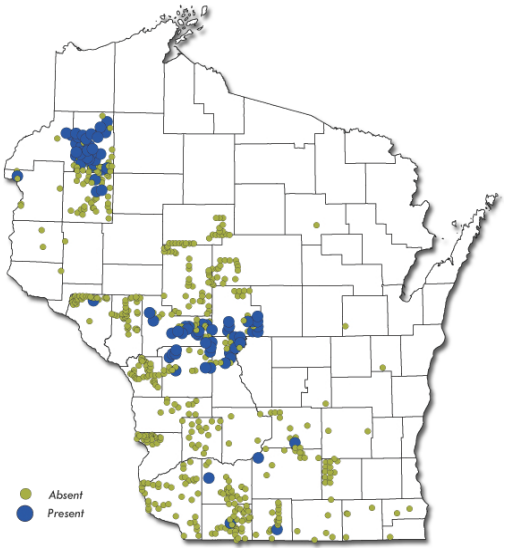


Figure 11. DATCP spotted knapweed survey, 2012.

Invasive Weed Surveys

A large-scale weed survey was conducted in 2012 at 598 locations. Presence/absence data was collected for three important invasive species: spotted knapweed, common tansy and black swallow-wort. The target weeds were selected based on the need for more comprehensive baseline distribution records to inform future biological control efforts.

Spotted knapweed was the most common of the three species, found at 12% of surveyed sites (Figure 11), while common tansy was noted at 10% of sites. Black swallow-wort was not observed at any of the 598 sites.

In addition to showing presence or absence, the survey also revealed pronounced regional variation in weed pressure. Most spotted knapweed, for example, was found in the central and northwestern districts where an average of 46% and 26% of sites were infested, respectively. Tansy was documented most often in the north-central (33%) and northwest (29%) areas.

Larinus obtusus, a spotted knapweed biological control agent

BIOLOGICAL CONTROL & WEEDS *continued...*

Results of the survey indicate invasion pressure from both spotted knapweed and tansy is highest in the central and northern areas of the state and this is where future introductions of biological agents should be concentrated.

Oberea erythrocephala, a leafy spurge biological control agent

SEED CONTROL

The Seed Control Program monitors and enforces labeling, germination and purity requirements to assure quality seed is sold in Wisconsin. Field inspectors perform a range of duties, such as evaluating labels for compliance, issuing stop sale orders, and collecting official samples for analysis.

Three hundred and thirty-five samples from 91 of 217 licensed labelers were collected by DATCP inspectors in 2012. 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 11.3%, which represents a 1.5% decrease from last season. Of these violations, four were rated as *technical*, 22 were rated as *minor*, and 16 were rated as *serious*.

All licensed labelers in the state are sampled or inspected on a three-year rotation. The program currently inspects an average of 33% of the 730 labelers annually and samples approximately 14%.

SEED COMPLIANCE ACTIONS TAKEN IN 2012:

- ***17*** *seed lots were relabeled to meet compliance standards*
- ***7*** *lots were removed from sale by the labeler*
- ***4*** *lots were returned to the labeler*
- ***6*** *lots were sold and planted before compliance actions could be taken*

Table 5. Number of seed labelers inspected, samples collected and violation rates, 2003-2012.

Year	Labelers	Samples	Violations	% Violation	% Labelers Inspected	% Labelers Sampled
2003	691	349	66	18.9%	33%	11%
2004	700	406	53	13.1%	37%	14%
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%