

WISCONSIN PEST BULLETIN

Timely crop pest news, forecasts, and growing season conditions for Wisconsin



STATE OF WISCONSIN DEPARTMENT OF AGRICULTURE, TRADE AND CONSUMER PROTECTION PLANT INDUSTRY BUREAU
2811 Agriculture Dr. Madison, WI 53718 • <http://pestbulletin.wisconsin.gov>

WEATHER & PESTS

Unusual weather patterns characterized the 2018 Wisconsin growing season. Spring featured a sudden transition from a historic cold, snowy April to a record warm May. As a result, the planting season was generally compressed, with fieldwork starting late in many areas but mostly ending on schedule. Summer crops exhibited rapid germination and growth due to the late May heat, and more than 50% of the intended corn and soybean acreage was planted during the two-week period ending May 27. Soybean emergence reached 51% by June 3, well ahead of the 5-year average of 44%. Other notable weather developments of the season included above-average June rainfall over much of Wisconsin with contrasting dryness in the central and northern areas; intense late August storms that produced catastrophic flooding across the southern counties; and persistent wet fall conditions that contributed to severe plant disease problems and impeded harvest. The season's weather irregularities translated into widely variable outcomes for growers, ranging from record harvests for some, to complete crop loss for others.

PEST HIGHLIGHTS

EUROPEAN CORN BORER: The fall European corn borer survey found the lowest population in 77 years, 0.01 borer per plant. The previous record-low state average

was 0.02 borer per plant in 2015. Larvae were absent from 90% of the 229 sampled fields in September and October, while only 10% showed signs of infestation. USDA statistics indicate Wisconsin's Bt corn use rate reached an all-time high of 75% of planted acres in 2018, though the ECB population has remained consistently very low (<0.11 borer per plant) for more than a decade. Continued low ECB levels should be expected in 2019.

TRUE ARMYWORM: Significant spring moth flights and delayed grassy weed control contributed to severe outbreaks of second-generation armyworms in July. Infestations were the most widespread in at least eight years and considerable corn and small grains acreage was treated to bring the caterpillars under control. Problems were reported most often from north-central and western Wisconsin, with isolated fields statewide experiencing varying levels of damage.

BOXWOOD BLIGHT: A new state record was established on July 19 with the first Wisconsin detection of boxwood blight, a destructive fungal disease that causes brown foliar lesions and leaf drop. The infected shrubs were found in a Kenosha County nursery during a routine inspection. Customers that may have received infected stock were notified by the nursery and no additional cases of the disease were identified outside of Kenosha County. Boxwood blight is a significant concern for the ornamental horticulture industry. Residents who suspect

boxwood blight are encouraged to contact their local UW-Extension office.



Boxwood blight lesions

Reba Gruber DATCP

BROWN MARMORATED STINK BUG: Range expansion continued into western Wisconsin this year, with new specimen records established in Eau Claire, Jackson, La Crosse, Marquette, Richland, and Trempealeau counties. The highest densities of this invasive pest are now concentrated in the Madison, Green Bay, Janesville, and Milwaukee-Waukesha areas. The Wisconsin BMSB distribution map currently includes 27 counties, primarily in the southern and eastern regions.



BMSB nymphs on blackberries Bernadine Strik Oregon State University

CORN ROOTWORM: Beetle pressure remained historically low for the second consecutive season. DATCP's August survey of adult rootworms documented a state average of 0.2 beetle per plant, the same average as in 2017 and tying the lowest count since 1971. Contributing factors to the low counts include continued high use of

Bt-rootworm corn and reduced egg populations entering the 2018 season.

BASIL DOWNY MILDEW: Although official detections were confirmed in only two counties in 2018 (Dodge and La Crosse), anecdotal reports suggest the incidence of this fungal-like disease was much higher. First identified in Wisconsin in 2010, basil downy mildew (BDM) causes abrupt rapid defoliation of entire basil plants. Fungicidal control of BDM is discouraged, thus growers must rely on frequent monitoring followed by immediate harvest upon first detection of disease symptoms.

FORAGES & GRAINS

ALFALFA WEEVIL: Spring weevil populations in first-crop alfalfa were low in 2018. Larval emergence began in southern Wisconsin by May 15 and peak weevil feeding was predicted for June 1-14 across much of the state. Sweep net counts remained low (<1.0 per sweep) through early June, and leaf tip feeding estimates fell well below the 40% economic threshold in all surveyed fields. Alfalfa fields harvested by mid-June did not sustain significant defoliation. The larval damage period closed before the end of the month.

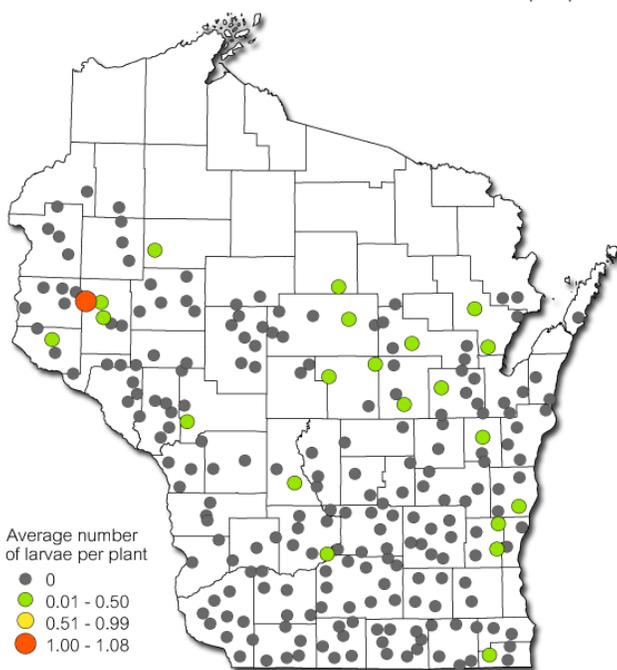
POTATO LEAFHOPPER: Migrants first arrived in the state during the week of May 24-30, about a week later than normal. DATCP surveys documented low to moderate counts from June through August and chemical control was generally not necessary. Although a few western Wisconsin fields sampled in late July contained localized "hot spots" of high leafhopper counts, none had a field-wide average exceeding the 2.0 leafhopper-per-plant threshold for alfalfa growth 12 inches or taller. Most sites sampled this year had averages in the range of 0.5-1.5 per sweep.

PEA APHID: Egg hatch was confirmed on May 7. Aphid densities in alfalfa began escalating by mid-May and continued to increase throughout June, which was contrary to their usual pattern of peaking by early June and then decreasing before the end of the month. Counts averaged 18 aphids per sweep during the last week of June, with a few sites containing very high numbers of 25-35 per sweep. Populations declined markedly by the third week of July and remained low in August. The season's highest count of 35 aphids per sweep was recorded on July 3 in Green Lake County.

CORN

EUROPEAN CORN BORER: Larval counts in September and October were the lowest in 77 years of annual surveys. The 2018 state average ECB population decreased to 0.01 borer per plant or 1 larva per 100 plants, falling below the previous record of 0.02 borer per plant set in 2015. Seven of the state’s nine agricultural districts showed averages less than or equal to 2017 levels, while negligible increases were noted in the west-central and northeast areas. Larvae were found in only 10% of the fields, with infestation rates below 36% at all but one Dunn County site which averaged 108%. The exceptionally low ECB pressure documented by the fall survey should provide reassurance to growers who planted non-trait corn seed in 2018, though conventional acreage will continue to require a higher level of scouting and management to address local variability in seasonal ECB abundance.

European Corn Borer Survey Results 2018
State Ave. = 0.01 borer per plant



Wisconsin Department of Agriculture, Trade and Consumer Protection 

TRUE ARMYWORM: Conditions favored mid-season armyworm populations and outbreaks developed in July in scattered areas of the state. Reports of severe infestations in barley, corn, oats, peas, and wheat were received from several counties, including Clark, Columbia, Eau Claire, Marquette, La Crosse, Rusk,

Taylor and Vernon, with a few accounts of masses of caterpillars migrating across roadways. The armyworm outbreak subsided by late July due to pupation of second-generation larvae and insecticide treatment of many acres of cropland.



True armyworm larva Krista Hamilton DATCP

CORN EARWORM: The DATCP network of 14 pheromone traps captured a cumulative total of 7,905 moths, with the majority arriving during the six-week period from August 2-September 12. More than one-quarter of the migrants (2,269) were collected at the Beaver Dam (Dodge County) location. Three other sites in Dane, Dodge and Fond du Lac counties also reported high cumulative counts of 500 or more moths. This year’s total count was nearly three times larger than that of 2017 when 2,760 moths were captured in 15 traps. Corn earworm flights ended about September 26.

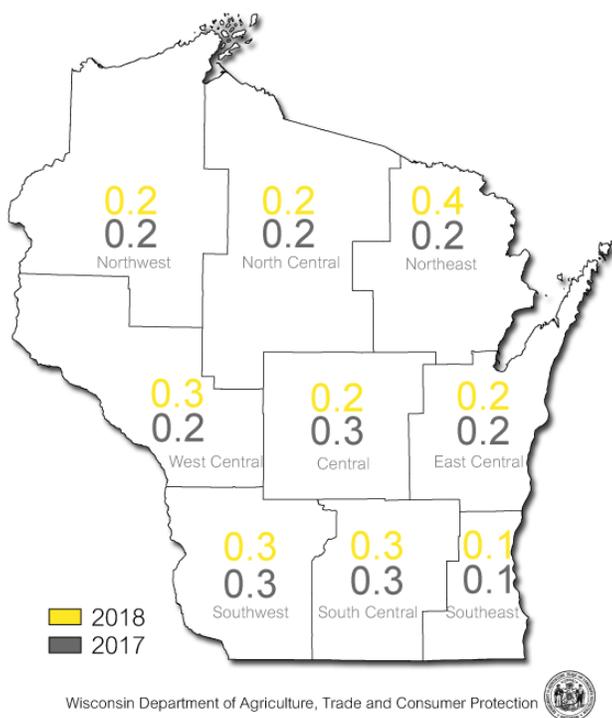
BLACK CUTWORM: Larval feeding injury was encountered in unexpectedly few cornfields surveyed in spring of 2018, despite planting delays and large moth flights throughout May. The cumulative total count for the April 12-June 13 survey period was 2,217 moths in 47 traps, with an individual high of 291 moths near Waupun in Dodge County. In 2017, the survey captured 3,228 moths in 45 traps. Although this year’s trap counts indicated a large and threatening spring moth migration, economic damage to emerging corn was not as common as anticipated.

CORN ROOTWORM: Beetle populations were historically low again this year. The 2018 state average count of 0.2 beetle per plant was equivalent to the 2017 average, while numbers in the state’s nine crop reporting districts remained at or below 0.4 beetle per plant for the

second year in a row. The only district-level increases in 2018 occurred in the west-central and northeast areas, where the averages rose from 0.2 beetle per plant in 2017 to 0.3 per plant and from 0.2 to 0.4 per plant, respectively. A minor decrease was recorded in the central district. Above-threshold counts of 0.75 or more beetles per plant were found in 21 of 229 (9%) fields surveyed, low to moderate counts of 0.1-0.7 per plant were found in 81 fields (35%), and no beetles were observed at 127 (56%) of the survey sites.

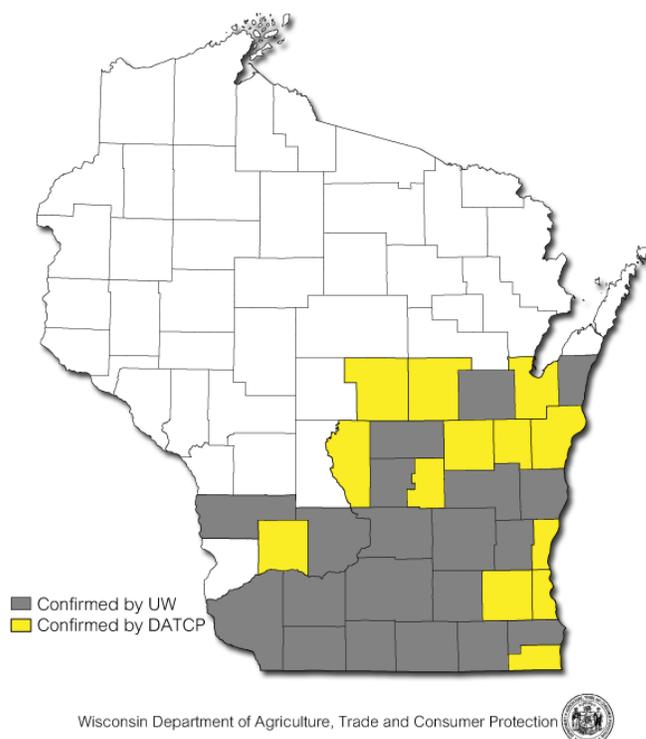
Again this season the northern species outnumbered the western species by a 2:1 ratio. The 2018 total beetle count was 566, with 379 being the northern variety and 187 westerns. In 2017, a total of 347 northern, 176 westerns, and 5 southern were counted, 528 adult rootworms in all.

District Average Number of Corn Rootworm Beetles per Plant



DATCP in 33 southern Wisconsin counties in September and October. Nearly all (97%) of the 79 fields sampled by DATCP were infected.

Corn Tar Spot Observations 2018



SOUTHERN CORN RUST: Southern corn rust (*Puccinia polysora*) was confirmed in the state this fall, at trace levels on three samples from fields in Sauk, Richland, and Walworth counties. This fungal disease occasionally develops before harvest in years when weather patterns are conducive for movement of rust spores into Wisconsin. As in the past, its arrival in 2018 was generally too late to cause yield losses.

BACTERIAL LEAF STREAK: A corn leaf sample from Pierce County tested positive for *Xanthomonas vasicola* pv. *vasculorum* in August, representing a new state record. The sample was collected by UW Field Crops Pathologist Damon Smith on August 7 and confirmed by the UW Plant Disease Diagnostic Clinic on August 23, with verification by an authorized USDA identifier on September 6. Although a pathogen of concern, this organism is not a quarantine pest.

WESTERN BEAN CUTWORM: Moth counts remained unusually low throughout the 2018 flight, a trend attributed to defective lures. In late July, the Pest Survey Program was notified by a consultant that his traps had

CORN TAR SPOT: This foliar disease reached epidemic levels in Wisconsin and the Midwest in 2018. Reported for the first time in the state in 2016, tar spot (*Phyllachora maydis*) appeared late in the season and was considered a mainly cosmetic problem. However, this year the disease developed earlier and was widespread. Damage varied from minor to severe, with many cases of early dry-down and complete death of fields reported. Tar spot was documented by the UW Field Crops Pathologist and

collected substantially more moths than the DATCP traps. The lures used by the consultant and DATCP were produced by different manufacturers; DATCP's were found to have a lower pheromone load rate. In all, the 55 DATCP traps captured just 607 moths during the period of June 20-August 23, while the consultant's 16 traps caught 2,344 moths.

Pheromone load inconsistency is a common problem in lure manufacturing that likely influences lure attractiveness and reliability from one season to the next. Although WBCW counts can be beneficial in timing the start and peak of the moth flight, growers are reminded that WBCW trap numbers should not be interpreted as a predictor of field damage.



Western bean cutworm moth

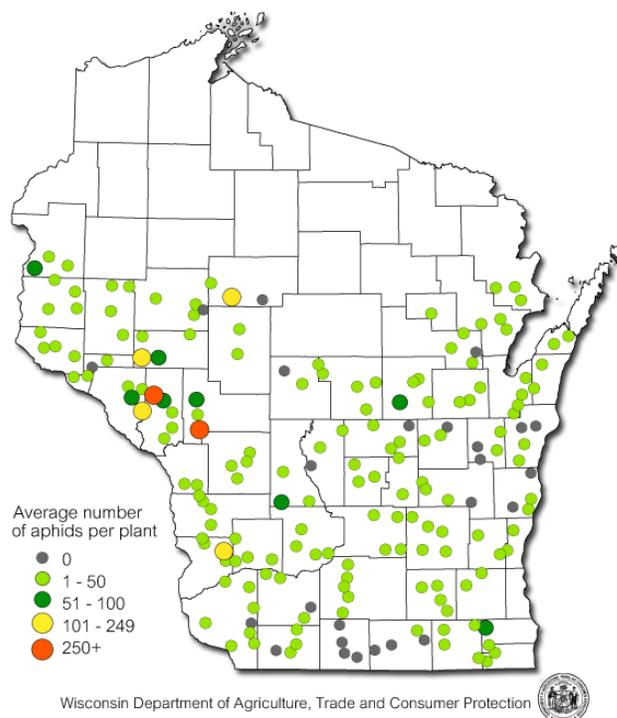
themothman.blogspot.com

SOYBEANS

SOYBEAN APHID: Aphid populations reached the 250 aphid-per-plant treatment threshold in scattered fields during the first two weeks of August, but densities on a statewide scale were mostly low this season. The annual survey conducted from July 23-August 21 found a statewide average count of 14 aphids per plant. This was an increase from six aphids per plant last year and eight aphids per plant in 2016, still far below the threshold. One hundred and eighty-nine soybean fields in the R2-R6 growth stages were surveyed, with aphids counted on 40 plants per field. Only two sites, one each in Jackson and Trempealeau counties, contained above-threshold populations of 260 and 290 aphids per plant. Densities were below 100 aphids per plant in 96% of fields, and the majority of those sites (86%) had average counts of less than 25 per plant.

Results of the survey suggest that while aphid pressure was slightly higher in 2018 than in the previous two years, most sampled soybean fields did not meet treatment guidelines during the survey timeframe. In addition, no cases of pyrethroid insecticide failure were reported or confirmed in the state.

Soybean Aphid Survey Results July 23 - August 21, 2018



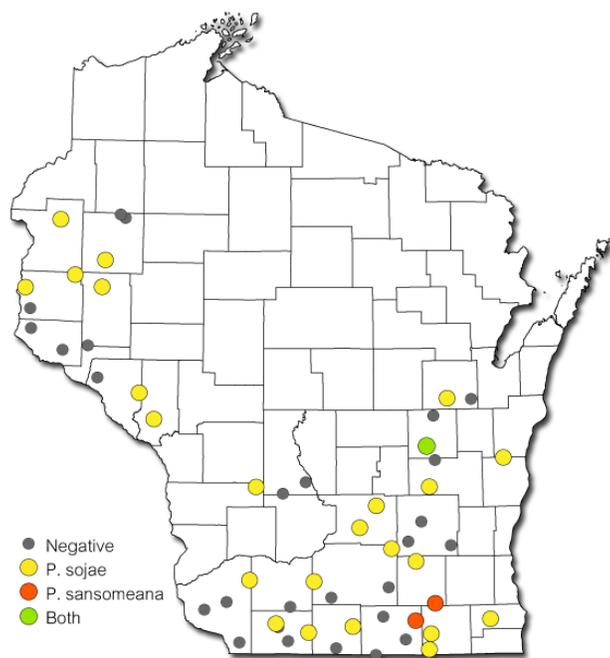
SOYBEAN GALL MIDGE: An emerging pest of Midwestern soybeans, the soybean gall midge (SGM) was not found in Wisconsin this year. Populations were confirmed in 12 western Iowa counties, as well as in Nebraska and South Dakota. Larvae of the SGM, a member of the Hessian fly family (Cecidomyiidae), feed internally at the base of soybean stems and cause stem discoloration. Infested plants snap off near the ground and the orange maggots can be found feeding inside. Much remains unknown about this insect, including the exact species and whether it is a direct or a secondary soybean pest. Consultants and soybean growers are encouraged to become familiar with SGM for 2019.

SEEDLING ROOT ROT: DATCP surveyed 54 soybean fields from June 11-July 6 for seedling root rot diseases. Twenty seedlings from each field were tested at the Plant Industry Bureau Laboratory (PIB Lab) for *Phytophthora sojae*, general *Phytophthora* species, and general *Pythium* species, using molecular methods. Testing

confirmed 46% (25 of 54) of fields were positive for *P. sojae* and 96% (52 of 54) were infected with *Pythium*. The *Phytophthora* rate was a marked increase from the two previous years when the pathogen was found in 24% (in 2017) and 32% (in 2016) of fields. Surveys in the past decade have found *P. sojae* prevalence ranging from 13% in 2011 to 49% in 2014. The increase in *Phytophthora* root rot was likely due to excessively wet spring conditions.

In addition, another *Phytophthora* species, *Phytophthora sansomeana*, was found in three fields in Jefferson, Rock, and Winnebago counties. Since the first Wisconsin detection in 2012, *P. sansomeana* has been documented in twelve counties: Calumet, Dane, Dodge, Dunn, Eau Claire, Green, Jefferson, Outagamie, Marathon, Rock, Sheboygan, and Winnebago. This year both Rock and Winnebago were new additions to this list.

Soybean Phytophthora Survey 2018



Wisconsin Department of Agriculture, Trade and Consumer Protection



JAPANESE BEETLE: This insect was a leading pest of concern to Wisconsin soybeans again in 2018, second only to the soybean aphid. Surveys in July and August found defoliation in 72% of fields. In 2017, a banner year for Japanese beetle in Wisconsin, 87% of surveyed sites had some degree of feeding. Sweep net sampling during the August aphid survey yielded average counts ranging from 0-21 beetles per 100 sweeps in the state's nine crop

districts. Areas with the highest numbers were the south-east (21 per 100 sweeps), south-central (17 per 100 sweeps) and west-central (13 per 100 sweeps) districts (see Table 3 pg. 144). The state average was 8.4 beetles per 100 sweeps. The prevalence of Japanese beetles documented by the survey signals that this invasive pest continues to pose a significant threat to the state's soybean crop.



Japanese beetle feeding on soybean leaf

Krista Hamilton DATCP

FRUITS

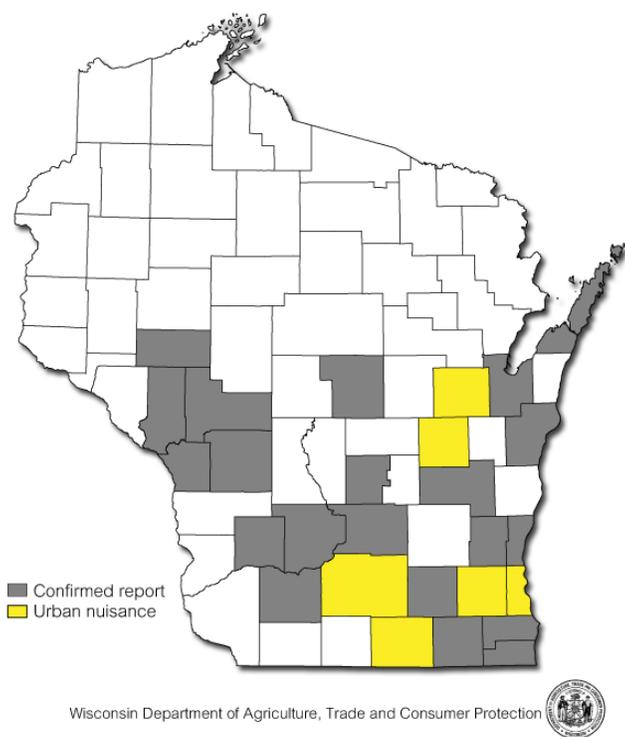
CODLING MOTH: The earliest moths were trapped on May 17, and most monitoring sites established a spring biofix from May 20-26. Record-setting late May heat caused a heavy, compressed emergence, with very large flights of 30-70 moths reported from several orchards. Treatments targeting first-generation larvae began by June 7 but were complicated by rain. Flights declined around the end of the month.

Summer emergence began by mid-July and unusually large counts (15-45 moths) continued throughout August. The high summer codling moth pressure was an indicator of the ineffective spring generation control due to rain diluting larvicide coverage during the early June treatment window. Codling moth flights continued into early September, and additional late-season spot treatments were required for several orchards.

BROWN MARMORATED STINK BUG: Monitoring by DATCP cooperators and IPM Institute consultants in 39 orchards and 12 vineyards resulted in captures of BMSB on traps at six sites. All clear sticky panels collected fewer than 20 total specimens during the late June through

October survey period. However, in Janesville, another trap type—the dual funnel trap from Great Lakes IPM—captured 258 BMSB (173 adults and 85 nymphs). Rock County is one of several counties (along with Dane, Milwaukee, Outagamie, Waukesha, and Winnebago) where concentrations are high enough that BMSB has become an urban nuisance. The majority of range expansion this year occurred in western Wisconsin, particularly in Eau Claire, Jackson, La Crosse, Marquette, Richland and Trempealeau counties. Twenty-seven of the state's 72 counties are now known to be infested with BMSB.

Brown Marmorated Stink Bug Status in WI November 2018



sites, and larvae were common in raspberries and other small fruits by early July.

SPOTTED LANTERNFLY: Surveys for this pest in nine Wisconsin apple orchards and 12 vineyards were negative in 2018. Spotted lanternfly has not yet been found in the state.



Spotted lanternfly

Dalton Ludwick USDA ARS

APPLE MAGGOT: Emergence of flies began in orchards by June 27. Counts were mostly low for much of the summer, with the largest trap captures documented during the week of July 26-August 1. The season's high count of 22 flies on a red sphere trap was reported from Crawford County.

BLUEBERRY MAGGOT: A fourth season of survey work to determine the distribution of the blueberry maggot in Wisconsin resulted in no additional detections. A new state record was established in 2016 when adult flies were collected for the first time in Adams and Sauk counties. This year's survey consisted of yellow sticky traps set at eight sites in five counties. The ammonium acetate-enhanced traps were placed in wild and cultivated blueberries and checked every three weeks in July and August. No flies were captured. Currently the blueberry maggot fly is known only from Adams and Sauk counties in central Wisconsin and it remains unclear if the species occurs more widely in the state.

JUNE BEETLE: Localized heavy June beetle populations were noted in southern Wisconsin in spring. According to one report from the Boscobel area of Grant County, the beetles severely defoliated young oaks and fruit trees, causing complete loss of the first flush of leaves. The largest numbers were observed during the latter half of May into June.

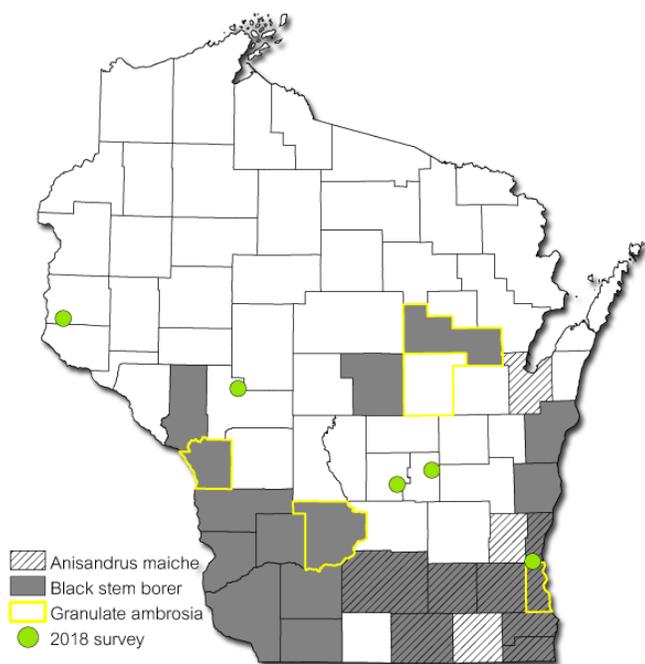
SPOTTED WING DROSOPHILA: The first SWD flies of the season were captured in UW traps on June 1 in Dane County. This date compares to June 5 in 2017, and June 10 in 2016, and suggests that SWD are appearing earlier each year. Significant SWD fly captures were first reported during the week of June 17-23 at monitoring

NON-NATIVE AMBROSIA BEETLES: The non-native ambrosia beetle *Anisandrus maiche* was detected for a second year in honey locust liners at a Wisconsin nursery, with infested plant stock found in Ozaukee and Washington counties in 2017 and 2018, respectively. In addition to nursery detections, this beetle has been

identified in trap bycatch from exotic woodborer and bark beetle surveys since 2016—over 400 specimens have been collected across 10 southeastern counties and in Brown County.

Although DATCP has been tracking non-native ambrosia beetles through trap bycatch since 2013, this was the first year a targeted survey was conducted in five Wisconsin nurseries. Besides *A. maiche*, the non-native black stem borer, *Xylosandrus germanus*, and *Xyleborinus saxesenii* were also collected at the Ozaukee County nursery. The granulate ambrosia beetle, *Xylosandrus crassiusculus*, was not found this season, but this species had previously been found at a sawmill in 2013. Infestations of *X. germanus*, *X. crassiusculus* and *A. maiche* are still limited, while *X. saxesenii* has been detected statewide. Properly-timed trunk sprays are the standard treatment for protecting plant stock from ambrosia beetles.

Exotic Ambrosia Beetle Detections 2013-18



Wisconsin Department of Agriculture, Trade and Consumer Protection



APIARY INSPECTION: Apiary inspectors visited 200 beekeepers this year, opening 3,342 hives for inspection. Based on these voluntary inspections, winter mortality decreased from 54% in 2016-17 to 47% in 2017-18, which is slightly higher than the 40% national average winter loss for beekeepers during the same time period. Varroa mite was detected in 58% of hives sampled for this pest, compared with 64% last season. Other pests

and diseases found include American foulbrood in 0.1% of hives, chalkbrood in 1.1% of hives, European foulbrood in 0.3%, deformed wing virus in 1.2%, sacbrood in 1.4%, and small hive beetle in 1.7% of hives. Pest and disease issues were generally down this year, although frequent rain interrupted inspection schedules. Also due to the persistent wet weather, there were more broodless periods this spring, resulting in lower mite populations. Inspectors issued 71 apiary inspection certificates for 31,240 migratory hives, primarily destined for California, Florida and Texas to be used for pollination services.

ROSE CHAFER: High populations of this generalist pest appeared in mid-June in vineyards and orchards, where the beetles skeletonized leaves and damaged developing fruit clusters. Reports of minor damage to grapes, raspberries, strawberries, fruit trees, and landscape plants were common. Chafer feeding subsided in most areas by mid-July.



Rose chafer beetles

Krista Hamilton DATCP

VEGETABLES

LATE BLIGHT: Disease progression was limited by late-season heat, spotty rainfall, and timely fungicide applications, and few cases developed in 2018. The state's first infected commercial potato fields were confirmed by the UW Plant Pathology Department in Adams and Marquette counties on August 9. One Waushara County site tested positive in late August, and a second Adams County field was confirmed in September, along with a single case of tomato late blight from Columbia County. Compared to 2017 when at least 13 counties had confirmed reports, late blight was less prevalent this year. All samples tested by UW from

Wisconsin were the US-23 pathogen genotype, which has not developed resistance to phenylamide fungicides such as mefenoxam.

BASIL DOWNY MILDEW: Many gardeners observed sudden decline of their basil plants this summer due to this destructive disease. Although only three cases were officially diagnosed, two from Dodge County and one from La Crosse County, several unofficial reports were received. Basil downy mildew (BDM) spreads via wind-dispersed spores, rapidly infecting entire fields and causing complete plant loss. BDM is often present on greenhouse-grown basil in garden centers in the spring, though it may not progress until late summer. Purchasing disease-free plants, promoting airflow, and frequent monitoring of the crop so harvest can occur quickly once mildew symptoms appear are all important controls. Use of fungicides for BDM control is not recommended.



Basil downy mildew

UMN Extension

CUCURBIT DOWNY MILDEW: Cucurbit downy mildew (CDM) was first diagnosed on August 17 in Columbia County, with subsequent detections in Crawford, Dane, Ozaukee, Portage, and Waushara counties. The CDM-positive sites included commercial pickling cucumber fields, fresh market plantings, and UW research plots. This aggressive foliar disease produces no direct symptoms on cucumber fruits, but increases the risk of sunscald, causes secondary fruit decay, and reduces photosynthetic activity. Cucurbit downy mildew spreads into the northern U.S. in summer on airborne sporangia from infected plants in other states.

PURPLE CARROT-SEED MOTH: The UW-Madison Insect Diagnostic Lab confirmed on July 10 the first Wisconsin detection of the purple carrot-seed moth (*Depressaria*

depressana), a non-native European pest of carrots, dill, and related plants. Several larvae were collected from the Village of Luxemburg in Kewaunee County and identified by PJ Leisch. Additional sightings were reported throughout summer in Brown, Columbia, Dodge, Milwaukee, Racine, Sheboygan and Washington counties. The greatest impact expected from this insect could be to plants in the carrot family specifically grown for seed, such as coriander, dill, and fennel. According to Wisconsin observations, some dill umbels were infested with 2-3 dozen or more caterpillars. Larvae were also noted on cilantro and Queen Anne's lace.



Purple carrot-seed moth caterpillar

David Silsbee bugguide.net

NURSERY & FOREST

NURSERY INSPECTION: The Nursery Program licensed 621 nursery growers and 1,149 retailers this year, with personnel performing 689 site inspections statewide. Annual inspections are prioritized for out-of-state shippers and those holding a Plant Health Certificate. The program's goal is to inspect all licensees at least once every three years. The top 10 pests and disorders found this season were, by total number of detections: virus symptoms, leaf spots, powdery mildew, Japanese beetle, rusts, leafminers, apple scab, potyvirus, anthracnose, and non-viable nursery stock. Summarized below are highlights from the 2018 inspections.

BOXWOOD BLIGHT: This devastating fungal disease of boxwood was found for the first time in Wisconsin in July, at a Kenosha County production nursery. This led to an extensive delimitation survey and the collection of 165 *Buxus* and *Pachysandra* samples from the nursery and its satellite nurseries. The samples were screened with

microscopy at the PIB Lab and the initial positive verified by the USDA Mycologist. Two blocks of one field in the Kenosha County nursery were found to have boxwood blight. All infected plants were destroyed and the blocks scorched to eradicate the pathogen. Surrounding production blocks were placed on hold pending monitoring and re-inspection in 2019.



Boxwood blight

massnr.org

Independent from the Kenosha find, another potential introduction occurred on the boxwood variety “Graham Blandly,” grown out of state and distributed by a Midwest big box store. The variety was recalled from eight Wisconsin locations. Another 39 suspect boxwoods were pulled from 15 other Wisconsin nurseries, bringing the total to 204 samples tested this season. None of the additional samples and nurseries were positive for boxwood blight. The majority of boxwoods submitted to the PIB Lab were infected with other common diseases such as *Volutella* blight, *Macrophoma* blight, and *Fusarium* wilt.

In response to the recent boxwood blight cases, nurseries in Wisconsin are encouraged to enter into a Boxwood Blight Cleanliness Program Agreement with DATCP (contact Elizabeth.Meils@wisconsin.gov). The agreement is based on best management practices developed cooperatively by industry, researchers and government groups, when boxwood blight first appeared in U.S. in 2011.

SCALE INSECTS: Routine inspections found a variety of scale insect species on ornamentals and conifers, including elongate hemlock scale, Fletcher scale, hemlock scale, *Miscanthus* scale, pine needle scale, rose scale, and willow scale. *Miscanthus* scale (*Duplacionaspis*

divergens) had not previously been found in the state. Infestations were confirmed on Japanese silver grass (*Miscanthus sinensis*) at two nursery dealers in Milwaukee County and one each in Marathon and Oneida counties. This species is currently established in Florida, and although it seems unlikely that it can overwinter in Wisconsin, DATCP recommends double-bagging and disposing of any plant suspected of being infested with *Miscanthus* scale.

HEMLOCK WOOLLY ADELGID: Hemlock samples from nurseries in Grant, Ozaukee, and Waukesha counties were screened for hemlock woolly adelgid (HWA) and elongate hemlock scale (EHS). No hemlock samples were positive for HWA, though two nurseries in Ozaukee and Waukesha counties were positive for EHS. All EHS-infested hemlocks were removed from sale and either destroyed or treated with dinotefuran before being released.

Unlike HWA, EHS is not regulated with an external quarantine in Wisconsin. However, this invasive pest is not known to be established in the state and there is concern for the Christmas tree industry and native hemlocks given its broad host range.



Hemlock woolly adelgid

www.fs.usda.gov

MITES: Populations were noticeably high this year, likely influenced by favorably warm weather. Among the mites observed were species of broad mites, eriophyid mites (gall mites), rust mites, and spider mites, on a variety of herbaceous, coniferous, and deciduous ornamentals.

INVASIVE SPECIES RULE: Invasive plants prohibited or restricted in Wisconsin under the Chapter NR 40 Invasive Species Rule were found at 102 nursery locations this

season. The most common were Amur maple, Chinese wisteria, Japanese barberry, moneywort, ribbon grass or gardener's garters, and woodland forget-me-not.

Nursery managers are advised to review the invasive species rule prior to ordering plants for the 2019 season. The list currently includes 68 prohibited species, 63 restricted species, and 14 split-listed species. One important rule update this year was the expiration of the 3-year phase-out period for restricted herbaceous plants on May 1, 2018.

VIBURNUM LEAF BEETLE: An adult beetle was collected in August on an arrowwood viburnum shrub in Kenosha County. Kenosha was the fourth Wisconsin county in which viburnum leaf beetle has been detected since 2009, following Milwaukee, Ozaukee, and Winnebago.

LILY LEAF BEETLE: This newly-established invasive beetle was reported in two more counties this season: Langlade and Shawano. Lincoln County is currently the northernmost Wisconsin county in which the lily leaf beetle is known to occur, and Shawano County marks the eastern boundary. The southernmost record of the beetle is from Portage County. Lily leaf beetle was first discovered in the state in 2014, in Marathon County.



Lily leaf beetle

Warrener flickr.com

VIRUSES OF ORNAMENTALS: Of the 619 perennials and annuals submitted by inspectors for disease testing this year, 257 or 42% were analyzed by the PIB Lab for 11 different viruses. One hundred sixty-eight or 65% were positive for at least one plant virus. The most common viruses detected were in the potyvirus group, with 87 positives, 73 on Iris alone. Other hosts infected

with potyviruses were Freesia, Helenium, Hylotelephium, Hosta, Horseradish, Mandevilla, Narcissus, Sedum, Sidalcea and Tradescantia. Tobacco rattle virus was also prevalent, found in 26 samples, as was hosta virus X, diagnosed in 23 samples. Sixteen plants were positive for an Ilarvirus group test, canna yellow mosaic badnavirus was found on two canna hybrids "Orange chocolate" and "Cannova Yellow," and clematis chlorotic mottle virus was detected on clematis "Hagley hybrid." Tobacco mosaic virus infected angel trumpet "Charles Grimaldi" and lilac leaf chlorosis was found in lilac. Inspectors continued to work with producers and retailers to prevent virus-infected plant material from entering the retail chain. A table listing the PIB Lab's complete virus test results is provided on page 144.



Potyvirus in Iris

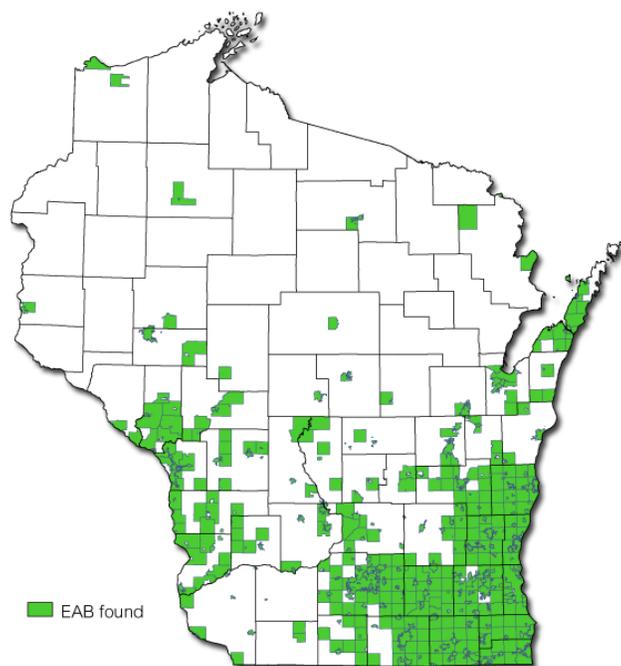
Tim Boyle DATCP

VELVET LONGHORNED BEETLE: This foreign long-horned beetle, *Trichoferus campestris*, was first detected in Wisconsin in July 2017 in Milwaukee County. Follow-up surveys were conducted in 2018, with 25 baited traps placed in urban industrial and manufacturing settings across 10 eastern Wisconsin counties, including Brown, Dane, Kenosha, Manitowoc, Milwaukee, Ozaukee, Racine, Rock, Sheboygan, and Washington. A total of 75 beetles were collected in nine traps, all in Milwaukee County in July and August. Continued trapping is planned for 2019 since the environmental and economic impacts from this pest are unknown.

EMERALD ASH BORER: DATCP enacted a statewide emerald ash borer (EAB) quarantine on March 30, placing all 72 counties under quarantine, including those with no EAB detections. Although EAB trapping was not conducted this year, reports of EAB infested trees

continued to be tracked and validated. An additional 77 new municipal detections within previously infested counties in were made in 2018, with just over 25% of the state's municipalities confirming EAB infestations since 2008. Three new county records were also confirmed: Clark, Kewaunee, and St. Croix. The latest detections were the result of reports from citizens, as well as state and county forestry staff. A total of 51 Wisconsin counties are now infested with EAB. Currently, the most severe damage is concentrated in the southern half of the state.

Emerald Ash Borer Detections 2008- 2018



Wisconsin Department of Agriculture, Trade and Consumer Protection



WALNUT TWIG BEETLE: A trapping survey to detect the walnut twig beetle (WTB) was conducted at three sawmills in Chippewa, Grant, and Sauk counties. The selected locations receive black walnut logs from out of state, increasing the risk of introduction of this non-native pest into Wisconsin. Nine baited Lindgren funnel traps were set mid-May and monitored through early September, with no beetles found in collection samples. DATCP has conducted WTB detection surveys since an exterior quarantine for thousand cankers disease went into effect in 2011.

GYPSY MOTH: The Gypsy Moth Program set 10,767 traps in 44 central and western Wisconsin counties in 2018. Preliminary data indicate the state total male gypsy moth catch decreased by approximately 29% from 2017

to 2018, with trappers reporting 76,447 moths (7.1 per trap) this season compared to 108,008 moths (9.9 per trap) the year before. The total number of positive traps containing one or more gypsy moths also decreased by about 24%, from 4,263 in 2017 to 3,262 in 2018. Population declines were most noticeable in northern and central Wisconsin, while populations in southern Wisconsin increased moderately or were similar to those of 2017. Program staff attribute these patterns to sustained periods of below-average 2017-2018 winter temperatures in central and northern parts of the state. Burnett County emerged as an outlier from this trend, remaining a gypsy moth hot spot west of the quarantine zone for a second consecutive year. As mentioned, the counts reported above are preliminary.

The DATCP Slow the Spread Program treated a total of 76,288 acres at 35 sites in 14 western Wisconsin counties from May 22-July 11. Btk was applied to 24,612 acres and mating disruption covered 51,676 acres. The DNR Suppression Program also treated seven sites totaling 486 acres with Btk in Dane County. There were no eradication sites or NPV treatments this year, and no new counties were added to the 50-county Wisconsin gypsy moth quarantine.



Gypsy moth larva

forestryimages.org

TABLE 1. CORN ROOTWORM BEETLE SURVEY RESULTS 2009-2018 AVE. NO. OF BEETLES PER PLANT

DISTRICT	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	10-YR
NW	0.4	0.3	0.1	0.5	0.7	0.5	0.2	0.5	0.2	0.2	0.4
NC	0.4	0.1	0.1	0.3	0.2	0.2	0.5	0.7	0.2	0.2	0.3
NE	0.6	0.1	0.3	0.6	0.2	0.1	0.2	0.7	0.2	0.4	0.3
WC	0.5	0.4	0.6	0.4	0.4	0.6	0.3	0.6	0.2	0.3	0.4
C	0.4	0.4	0.8	0.5	0.2	0.2	0.5	0.3	0.3	0.2	0.4
EC	0.6	0.3	0.5	0.4	0.3	0.3	0.8	0.4	0.2	0.2	0.4
SW	0.7	0.3	1.1	0.8	0.6	0.9	0.8	0.7	0.3	0.3	0.7
SC	1.1	0.3	1.4	0.9	0.5	0.3	0.8	0.4	0.3	0.3	0.6
SE	0.3	0.2	0.7	0.9	0.8	0.4	0.7	0.2	0.1	0.1	0.4
STATE AVE.	0.6	0.3	0.7	0.6	0.5	0.4	0.6	0.5	0.2	0.2	0.4

Survey results based on average number of beetles per plant per 10 plants examined.

TABLE 2. EUROPEAN CORN BORER FALL SURVEY RESULTS 2009-2018 AVE. NO. OF LARVAE PER PLANT

DISTRICT	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	10-YR
NW	0.06	0.08	0.15	0.04	0.07	0.06	0.03	0.13	0.09	0.02	0.07
NC	0.10	0.02	0.07	0.01	0.02	0.04	0.00	0.08	0.04	0.01	0.04
NE	0.12	0.19	0.13	0.05	0.02	0.01	0.04	0.00	0.00	0.02	0.06
WC	0.10	0.08	0.12	0.09	0.06	0.12	0.03	0.15	0.01	0.05	0.08
C	0.06	0.06	0.05	0.01	0.01	0.00	0.01	0.24	0.02	0.02	0.05
EC	0.09	0.01	0.03	0.01	0.01	0.01	0.04	0.00	0.01	0.01	0.02
SW	0.06	0.12	0.03	0.03	0.06	0.00	0.03	0.14	0.04	0.00	0.05
SC	0.02	0.07	0.20	0.01	0.08	0.01	0.02	0.14	0.06	0.00	0.06
SE	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.04	0.04	0.01	0.01
STATE AVE.	0.06	0.07	0.09	0.03	0.04	0.03	0.02	0.11	0.03	0.01	0.05

Survey results based on number of 4th and 5th instar corn borer larvae per plant.

TABLE 3. SOYBEAN PEST SURVEY RESULTS 2018 AVE. NO INSECTS PER 100 SWEEPS

DISTRICT	Bean leaf beetle	Japanese beetle	Northern CRW	Southern CRW	Western CRW	Green Cloverworm	Grasshopper	Stink Bug
NW	0.0	3.9	0.0	0.0	0.0	0.0	0.4	0.0
NC	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.4
NE	0.2	0.2	0.0	0.0	0.0	0.0	2.0	0.1
WC	0.0	13.2	0.0	0.0	0.0	0.4	1.4	0.3
C	0.0	3.6	0.0	0.0	0.0	0.1	1.3	0.2
EC	0.0	0.0	0.1	0.0	0.0	0.0	0.7	0.1
SW	0.1	7.7	0.9	0.1	0.1	0.6	1.4	0.2
SC	0.1	16.6	1.0	0.2	0.0	0.3	0.8	0.2
SE	0.4	20.6	0.4	0.1	0.0	2.9	1.5	0.2
STATE AVE.	0.1	8.4	0.3	0.1	0.0	0.5	1.2	0.2

TABLE 4. SURVEY OF VIRUSES IN ORNAMENTALS 2018 PLANT INDUSTRY LABORATORY RESULTS

VIRUS SAMPLES	POTY ¹	TRV ²	HVX ³	ILAV ⁴	CMV ⁵	INSV ⁶	CaYMV ⁷	TMV ⁸	TSWV ⁹	CCMV ¹⁰
No. of positives	87	26	23	16	9	2	2	1	1	1
No. of plants tested	111	68	47	36	71	50	2	54	50	3
Percent of positives	78%	38%	49%	44%	13%	4%	100%	2%	2%	33%

¹Potygroup viruses; ²Tobacco rattle virus; ³Hosta virus X; ⁴Illavirus group; ⁵Cucumber mosaic virus; ⁶Impatiens necrotic spot virus; ⁷Canna yellow mosaic virus; ⁸Tobacco mosaic virus; ⁹Tomato spotted wilt virus; ¹⁰Clematis chlorotic mottle virus.