ANNUAL REPORT 2023

Plant Industry Bureau

Wisconsin Department of Agriculture,
Trade and Consumer Protection
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About the Plant Industry Bureau

The Plant Industry Bureau protects Wisconsin's agricultural and horticultural industries and native plants by overseeing and ensuring compliance with laws and regulations involving plant pests, honeybees, nursery plants, Christmas trees, firewood, and seed. The bureau implements programs designed to prevent the introduction and spread of harmful plant pests and diseases, especially regulated introduced, invasive species.

Our Programs

Plant Industry Bureau programs include inspection, export certification, quarantine, and survey activities. The bureau also facilitates interstate and international commerce of Wisconsin agricultural products and commodities by certifying plant health and the pest-free status of plants and plant products.

Our Partners

To carry out its mission, the bureau maintains partnerships with the United States Department of Agriculture Animal and Plant Health Inspection Service (USDA APHIS), the USDA Forest Service (USDA FS), the Wisconsin Department of Natural Resources (DNR), the University of Wisconsin (UW), Tribal nations, and other state and federal agencies.

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Our E-Newsletters

The Plant Industry Bureau began offering its first email newsletter, *What's Growing On?* in 2021, followed by *Field Notes* and *Apiary Program News* in 2022. These three publications are written and compiled entirely by bureau staff, with distribution through the GovDelivery platform. Our e-newsletters are direct and effective outreach tools for reporting survey and inspection results, providing updates on plant pest interceptions and new detections, and informing readers about Wisconsin's plant protection regulations.

Apiary Program News

This quarterly newsletter provides program updates, inspection results, apiary import requirements, and honey bee and wild pollinator information. *Apiary Program News* also promotes best management practices in Wisconsin's Pollinator Protection Plan and is distributed to over 2,600 subscribers.

What's Growing On?

Issued monthly, this publication highlights important finds from our nursery and Christmas tree inspections. *What's Growing On?* also provides licensing information and timely program updates. This publication is issued to 4,300 subscribers, including nursery dealers, nursery growers, licensed Christmas tree growers, and the public.

Field Notes

This weekly Pest Survey Program update features articles on economically important plant pests affecting the state's field crops, fruits, vegetables, and forests, along with pest monitoring data and maps. *Field Notes* is emailed regularly during the growing season (April through August), and less frequently during the fall and winter months, to 3,000 subscribers.

Plant Protection Section

As the regulatory section of the Plant Industry Bureau, the Plant Protection Section works to detect, intercept, and prevent the spread of harmful plant pests that threaten Wisconsin's native and commercially grown plants and agricultural resources. Licensing, inspection, and certification are the major emphases of the section.

The section enforces Wisconsin statutes and departmental rules pertaining to the movement of plants, plant products, and honey bees.

Plant Protection Programs

Apiary

Nursery and Christmas Tree

Export Certification

Seed Labeling and Compliance

Firewood Certification

Forest Pest Regulatory

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Apiary Program

The Apiary Program inspects honey bee colonies and monitors their movement to reduce the risk and spread of honey bee pests and diseases in Wisconsin. The program also works to improve and protect the health of pollinators. According to USDA 2022 Census of Agriculture data, the state's robust beekeeping industry ranks 11th nationally for honey production. Beekeepers with five or more colonies produced 2.9 million pounds of honey valued at $8.9 million, and there were 53,000 honey producing colonies in Wisconsin. Apiary program activities include hive inspection (provided to beekeepers for free, upon request); enforcement of import reporting requirements and other beekeeping regulations; pollinator outreach and education; and inspection/certification of honey bee colonies leaving the state, typically for pollination services.

Two seasonal apiary inspectors conducted 236 inspections and opened 1,207 hives in 2023. Inspections found decreases in the incidence of Varroa mite and small hive beetle, as shown in the table below. Overwintering mortality also declined, from 68% in 2022 to 44% in 2023. However, inspections documented an increase in hives with American foulbrood and European foulbrood, as well as chalkbrood, sacbrood, and deformed wing virus. In 2023, the program issued 56 Certificates of Apiary Inspection for approximately 34,485 migratory hives, primarily destined for California and Texas for pollination services. The certificates are valid for one year from the date of issuance and serve as honey bee health documentation to support the interstate movement of honey bees. The department also oversees honey bee import rules designed to reduce risks posed by beekeepers bringing honey bees and used equipment into the state.

Apiary Inspection Results 2019-2023

	2019	2020	2021	2022	2023
Total hives opened	3,398	2,396	2,266	1,462	1,207
Varroa mite	51%	65%	41%	58%	41%
Small hive beetle	6.3%	2.1%	1.1%	2.1%	0.3%
American foulbrood	0.7%	0.6%	0.1%	0.0%	0.1%
European foulbrood	6.4%	1.2%	1.4%	0.4%	1.2%
Chalkbrood	5.9%	8.3%	5.2%	1.4%	3.8%
Sacbrood	4.8%	9.7%	8.4%	2.2%	3.1%
Deformed wing virus	11.8%	9.3%	4.2%	1.4%	4.9%
Est. winter mortality	32%	20%	42%	68%	44%

National Honey Bee Survey

Annual survey data and hive samples collected by apiary staff are part of the USDA National Honey Bee Survey (NHBS), aimed at tracking markers of colony health and monitoring for invasive honey bee threats. During the 2023 NHBS, inspectors collected 24 samples. Fourteen were from hives sampled one time and five were longitudinal samples collected twice, once before and once after honey flow. Colonies were visually inspected and sampled for Varroa mites, Tropilaelaps mites, Nosema levels, and viral pathogens, with testing performed at the USDA ARS Bee Research Lab. Samples were also analyzed for pesticide residues at the USDA AMS National Science Lab.

Annual results of the NHBS are available to the public on the Bee Informed Partnership Inc. (BIP) online research portal website at: **https://research.beeinformed.org/**.

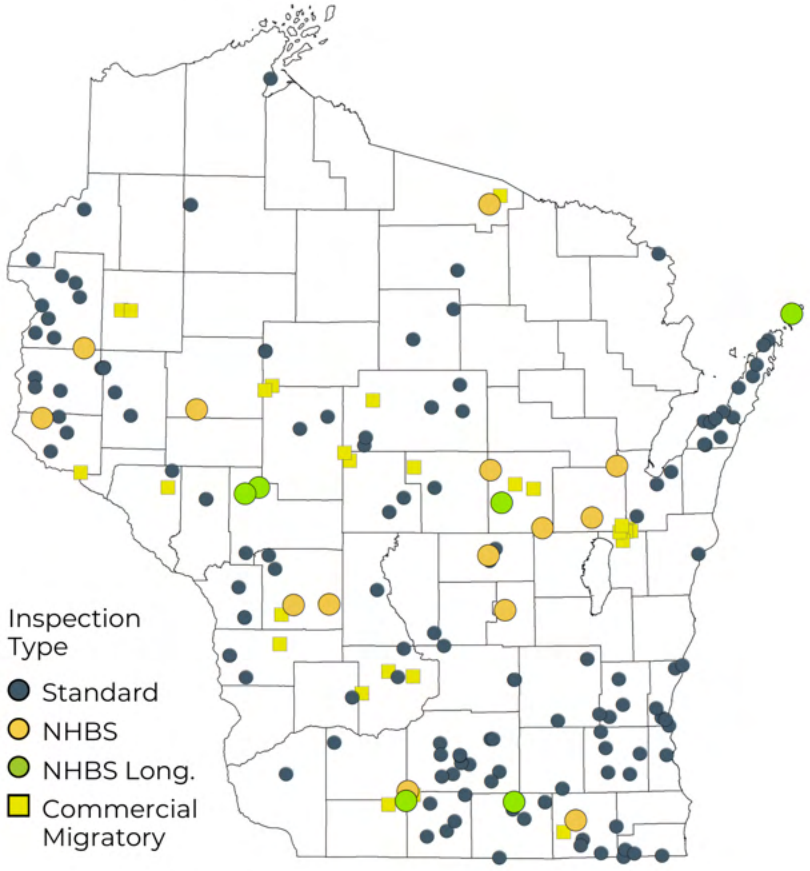
Apiary Program

Although all Wisconsin samples tested negative for NHBS exotic targets in 2023, concern about the accidental introduction of exotic pests continues to grow. Currently, the leading threat is Tropilaelaps, an external, parasitic mite native to Asia that feeds on honey bee brood. The range of Tropilaelaps is rapidly expanding and recent detections indicate greater adaptability to cold climates than previously known.

Another invasive threat is the yellow-legged hornet, *Vespa velutina*. Confirmed in North America for the first time on August 9, 2023 near Savannah, Georgia, this hornet is a generalist predator of honey bees and medium- to large-sized insects. By stalking bees near hive entrances, *V. velutina* intimidates workers to stop foraging. It may be transported in soil associated with plants, garden furniture, pots, timber, and vegetables.

If Tropilaelaps mites or *Vespa velutina* were to become established in the U.S., these exotic threats would cause significant losses to managed and wild honey bee colonies, crop pollination, and honey production.

DATCP INSPECTORS VISITED 236 BEEKEEPERS AND OPENED 1,207 HONEY BEE HIVES IN 2023



Map 1. Apiary Inspections Conducted in 2023

Apiary Outreach

Apiary outreach continued in 2023, with emphasis on providing honey bee management recommendations and promoting best management practices (BMPs) from the Wisconsin Pollinator Protection Plan. The BMPs describe ways to protect honey bees and the 400 species of native bees found in the state by improving habitat and mitigating threats to pollinator health. Outreach also included distribution of the quarterly Apiary Program e-newsletter to over 2,600 subscribers through GovDelivery and social media updates. Program staff delivered 19 presentations to apiary clubs and featured exhibit booths at the Wisconsin Honey Producers Association meeting, the Wisconsin State Fair, and the PBS Wisconsin Garden & Landscape Expo.

Nursery Program

The Nursery Program licenses nursery growers and dealers and inspects nursery stock for regulated pests. Nursery inspections promote the production and sale of healthy plants, help prevent the introduction of invasive pests arriving on imported stock, and facilitate interstate commerce through the issuance of over 100 nursery Plant Health Certificates (PHCs) for exported stock annually. DATCP inspectors also partner with DNR staff to ensure invasive plants regulated under the DNR Invasive Species Rule (NR 40) are not sold at nurseries.

DATCP provides an inspection every one to three years to licensed businesses. The program licensed 644 nursery growers and 1,253 nursery dealers in 2023, with staff inspecting 493 (55%) growing field locations and 452 (20%) dealer locations statewide. Annual inspections prioritized the 119 licensed nurseries who purchased PHCs, indicating intent to ship plant stock interstate.

Nursery inspection summary 2022-2023

	2022	2023
Nursery growers licensed	610	644
Nursery grower fields inspected	488	493
Nursery dealers licensed	1237	1253
Nursery dealers inspected	617	452
Plant Health Certificates	116	119
Compliance Agreements	87	60
Licensing violations	15	11
Labeling violations	6	3
Quarantine violation	2	11
NR-40 violations	84	36
Rejection notices sent	15	9

Nursery inspection | DATCP

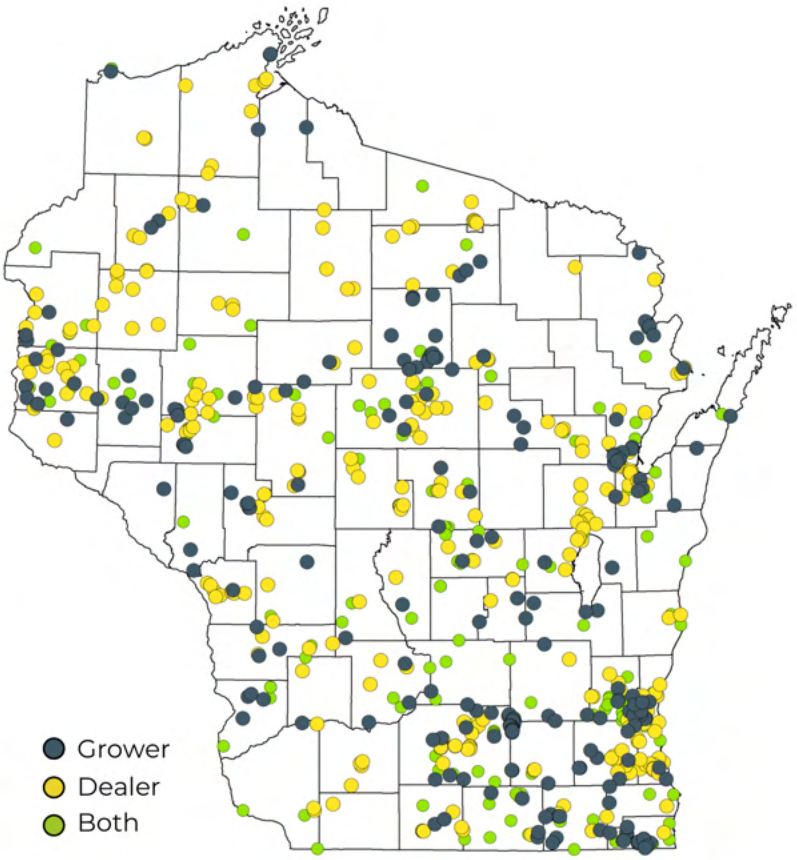
Nursery Program

Nursery Compliance Agreements

Inspectors also assist nurseries in determining if a compliance agreement is needed to import or export stock. Compliance agreements are annual contracts that provide limited pest quarantine exemptions to nurseries or businesses that implement prescribed risk reduction actions. Agreements associated with exterior quarantines are issued to nurseries importing plants from areas infested with regulated pests not found in Wisconsin, such as hemlock woolly adelgid or elongate hemlock scale (see asterisks below). Nurseries exporting stock out of a spongy moth quarantine county or an area of the state infested with Japanese beetle may also enter into an agreement with DATCP.

Nursery Compliance Agreements 2023:

- 3 Spongy moth
- 26 Hemlock woolly adelgid*
- 15 Japanese beetle
- 7 Elongate hemlock scale*
- 4 Black stem rust of wheat
- 3 Boxwood blight cleanliness
- 2 Blueberries to Michigan



Map 2. Nursery Inspections Conducted in 2023

Nursery Regulatory Actions

The Nursery Program issued 61 regulatory documents in 2023 (i.e., activity reports, orders prohibiting sale, pest abatement orders, and warning notices): 36 for invasive plant sales, 11 for licensing violations or other pest problems, 11 for quarantine violations, and three for labeling violations.

Inspectors also continued to educate and enforce the NR-40 Invasive Species Rule. Staff prevented the sale of restricted or prohibited invasive plants 36 times at 32 nursery locations in 2023, down from 84 times at 56 locations in 2022. Entities with multiple violations were referred to the DNR for enforcement. In addition, nine rejection notices were sent to four states in response to interceptions of scale insects, viruses, and invasive plants in shipments to Wisconsin.

What's Growing On?

The Nursery Program distributed licensing information, inspection highlights, and other program updates though it's *What's Growing On?* e-newsletter. Produced monthly since July 2021, this publication is sent to over 4,100 subscribers through GovDelivery. Subscribers include nursery dealers, nursery growers, Christmas tree grower license holders, and the public.

Nursery Program

Top Nursery Pest, Disease, and Abiotic Issues in 2023

The top insect pests observed most frequently by nursery inspectors in 2023 were spider mites, Japanese beetles, aphids, thrips, leafhoppers, and European elm flea weevils. Spongy moth life stages were also prevalent on nursery stock as the outbreak phase continued in Wisconsin. The most common diseases found were virus-like symptoms, powdery mildew, needle cast, rust, and leaf spots. Impacts of the severe summer drought in Wisconsin were also evident, with drought stress, sun scald, and mortality counted among the top abiotic stressors, along with chlorosis, winter injury, and herbicide damage (see table below).

New State Record: Thrips parvispinus or Pepper Thrips

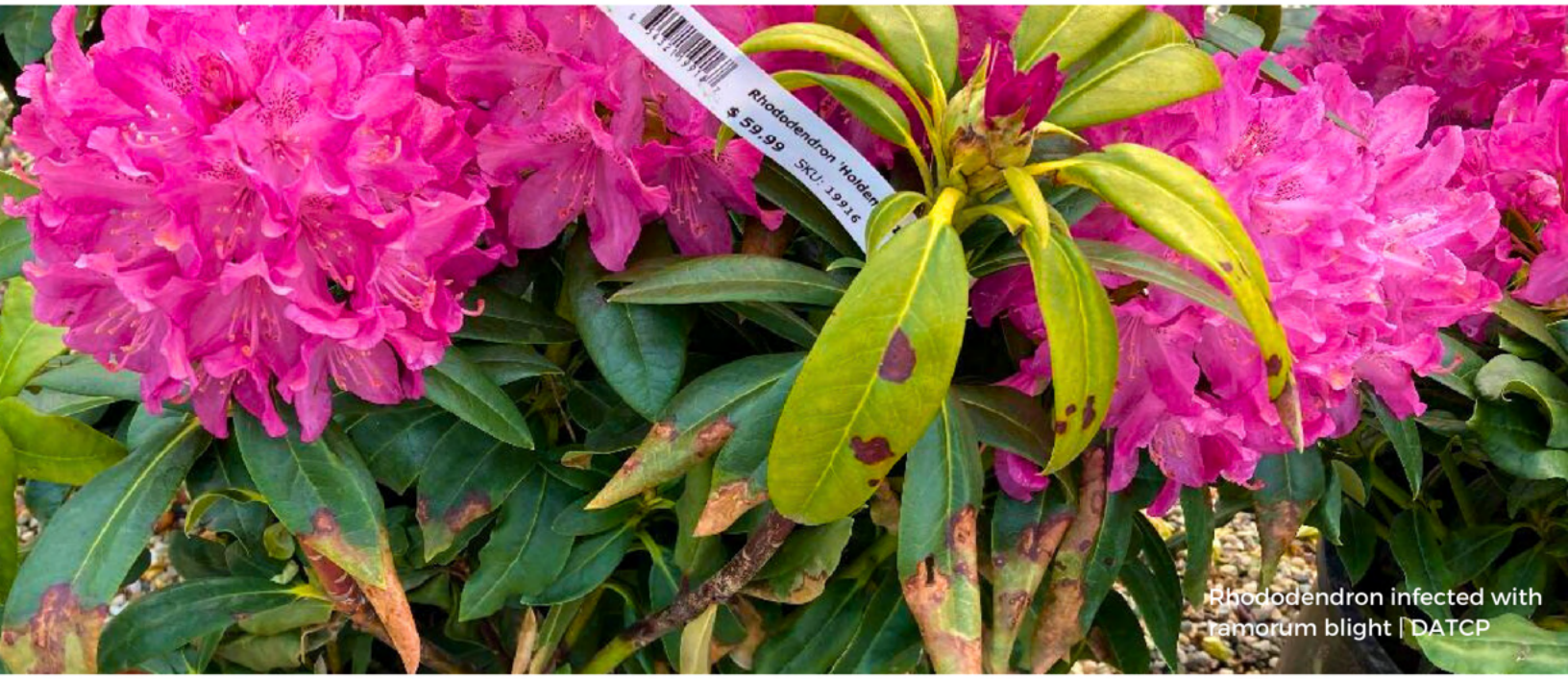
An invasive, introduced thrips species was detected in Wisconsin for the first time in 2023, representing a new state record. The species, *Thrips parvispinus*—commonly known as pepper thrips— was found at five retail nurseries in four counties: Dane, Milwaukee, Racine, and Washington. The detections were on tropical hibiscus and rocktrumpet plants from Florida.

Thrips parvispinus is recognized as a damaging pest of peppers around the world. It has spread from greenhouses into the environment in southern states and has established in parts of Florida since 2020. To understand how widespread it may be in the U.S., the USDA-APHIS asked state partners to include *T. parvispinus* on their target pest watch lists during spring nursery dealer inspections. DATCP inspectors easily found *T. parvispinus* on six samples of dipladenia, hibiscus, and mandevilla. Although no landscape impacts are expected from *T. parvispinus* in Wisconsin's colder climate, nurseries have been advised to scout for this pest in greenhouses where it can be difficult to manage.

Top 10 Pests, Diseases, and Abiotic Issues Found During Nursery Inspections in 2023

Pest	Count	Disease	Count	Abiotic	Count
Spider mites (spruce, maple)	334	Virus-like symptoms	191	Mortality	66
Japanese beetle	179	Powdery mildews	151	Chlorosis	49
Aphids	179	Needle cast	81	Drought or heat stress	49
Deer damage	86	Rust or pustules	67	Cold or winter injury	37
Balsam twig aphid	80	Leaf spots	67	Herbicide injury	28
Leaf galls	52	Tobacco rattle virus	62	Sun scald/leaf scorch	24
Leafhopper damage	52	Apple scab	49	Island chlorosis	21
Thrips	43	Volutella blight	39	Trunk wound	16
European elm flea weevil	39	White pine blister rust	38	Frost damage	14
Spongy moth	37	Tar spot of maple	36	Hail damage	6

Nursery Program



Rhododendron infected with ramorum blight | DATCP

Ramroum Blight Interception on Rhododendron

DATCP announced in June 2023 the interception of the invasive pathogen *Phytophthora ramorum* on nursery stock originating from a single source in Oregon. During spring inspections, nursery program specialists collected 36 symptomatic plants at 12 retail locations of a licensed nursery dealer in eastern Wisconsin, which led to 15 confirmed detections of ramorum blight. Initial testing of one azalea, one common lilac, and 34 rhododendron plants was performed at the DATCP Plant Industry Bureau Laboratory. Final verification was provided by the USDA Plant Pathogen Confirmatory Diagnostics Laboratory in Laurel, Maryland. The 15 positive plants, all rhododendron varieties, were: 'Holden' (12), 'Maxecat' (1), 'Nova Zembla' (1), and 'Purple Passion' (1).

Following the detections, DATCP, USDA-APHIS, and retail nursery staff removed, double-bagged, and destroyed (through deep landfill burial) 609 plants and associated pots, soil, and pallets within four meters of the infected rhododendrons. Nonporous surfaces were treated with bleach, and heat solarization was used to sanitize porous surfaces in July and August 2023.

To date, *P. ramorum* has never been detected on plants in the Wisconsin landscape. State and federal quarantines for this water mold pathogen, which is linked to sudden oak death, restrict and require prenotification for host material shipped from known infected areas in the western United States.

Nursery inspector checking boxwoods I DATCP

Nursery Program

Boxwood Blight

This disease of ornamental boxwood plants was first confirmed in Wisconsin in 2018. During 2023 nursery inspections, 43 symptomatic boxwood samples were collected for testing at the Plant Industry Bureau Lab. One sample from a retail nursery in Walworth County was positive for boxwood blight. The infected boxwood stock had been imported from Oregon and was ordered destroyed. Adjacent boxwoods were also monitored for disease symptoms throughout the growing season. Twenty-six of the boxwood samples were instead diagnosed with Volutella blight, another serious disease of this popular ornamental.

Boxwood blight has been confirmed at nurseries in Kenosha County; at retailers in Dane, Portage, and Walworth counties; and on landscape boxwoods in Dane, Door, and Milwaukee counties in the last six years. Three nurseries renewed DATCP boxwood blight compliance agreements in 2023.

Daylily Rust

Twelve detections of daylily rust were made at four separate locations of one retail chain in 2023. The infected cultivars, 'Titan Skye', 'Stormy Skye', and 'Blazing Skye', came from Georgia. To prevent the rust from spreading, inspectors issued an order for removal from sale and destruction of the diseased daylilies.

Sod Inspection

Thirty fields belonging to seven sod growers were inspected for pests in fall 2023 to facilitate the out-of-state movement of turf sod. Since Wisconsin is generally infested with Japanese beetle (JB), sod growers who ship beetle host material from areas infested with JB are responsible for complying with the certification requirements of receiving states. No regulated pests were found this year.

Nursery Program

Hemlock Woolly Adelgid

DATCP continued to work with Wisconsin nurseries importing hemlock nursery stock to ensure the hemlock is coming only from nurseries outside of HWA-infested areas or from nursery dealers with compliance agreements. A HWA compliance agreement verifies that stock from nurseries in infested states has been treated or inspected and found to be free from the adelgid, as required by the state HWA exterior quarantine. This year, 26 nurseries signed HWA compliance agreements with DATCP. Hemlock wooly adelgid was not found during nursery inspections in 2023, nor was the elongate hemlock scale (EHS), another invasive pest of hemlock nursery stock and other conifers. Details about the new EHS quarantine are included in the Christmas tree program summary.

Inspecting imported hemlock | DATCP

Japanese Maple Scale

An infestation of an unfamiliar scale insect was observed on a shipment of Cornelian cherry 'Golden Glory' trees from Ohio. DATCP identified the scale as the exotic Japanese maple scale (JMS) (*Lopholeucaspis japonica*). Although this non-native pest has been detected in Wisconsin before, it is difficult to control and is not widely established. The impacted stock was rejected and ordered to be destroyed.

Viburnum Leaf Beetle

Inspectors found viburnum leaf beetle (VLB) at 32 locations, primarily in southeastern Wisconsin. This introduced, invasive pest feeds exclusively on the leaves of viburnums, and both the adults and larvae cause severe defoliation and eventual shrub mortality. Native viburnums are an important understory component of many Wisconsin woodlands and are at risk as this insect becomes more widely established. Viburnum leaf beetle has been found in 14 Wisconsin counties since 2009. All VLB detections in 2023 were in previously confirmed counties (Dane, Kenosha, Milwaukee, Ozaukee, Racine, Sheboygan, Washington, and Waukesha).

Viburnum leaf beetle | DATCP

Christmas tree inspection | DATCP

Elongate hemlock scale | Joe Boggs OSU

Nursery and Christmas tree inspector | DATCP

Christmas Tree Program

Wisconsin ranks fifth in the nation behind Oregon, Michigan, North Carolina, and Pennsylvania in Christmas tree production. The state has 941 field locations with a combined 26,000 acres of fir, pine, and spruce trees. About 602,000 Christmas trees valued at $22 million are harvested annually in Wisconsin, according to the 2022 USDA Census of Agriculture. The majority of Christmas tree production occurs in the central and northern regions, in Jackson, Lincoln, and Waushara counties.

By licensing, inspecting, and certifying Christmas trees as being apparently free from regulated pests, the Christmas Tree Inspection Program offers a valuable service to producers of trees, wreaths, and roping who require certification to ship their products to other states or countries.

Annual Christmas tree field inspections begin September 1. Christmas trees, along with surrounding fence rows and wood lots, are inspected for spongy moth egg masses and other regulated pests, diseases, and abiotic problems (see table on page 15). Christmas tree producers shipping trees interstate and/or requesting a Plant Health Certificate are prioritized for inspection. In 2023, staff inspected 509 Christmas tree fields.

All Christmas trees originating in the state's 53-county spongy moth quarantine zone are subject to federal and state spongy moth regulations. Growers shipping trees from the quarantined areas to states or countries where the moth is not established are required to have their trees inspected and certified free of this pest prior to harvest. Choose-and-cut farms and other growers selling solely within the quarantine are not restricted. Spongy moth egg masses were found in 49 of the 509 fields inspected this year.

The program issued 374 Christmas tree grower licenses, 93 Plant Health Certificates, 25 Phytosanitary Certificates (mostly for international exports), and three State Phytosanitary Certificates (for interstate export) in 2023. The continued use of Survey 123 for mobile data collection has greatly increased efficiency.

Christmas Tree Program

Christmas Tree Lot Inspections

Christmas tree lot inspections are conducted from mid-November until Christmas. The inspections help to identify unlicensed growers, document tree origin and certification paperwork, and ensure Christmas trees are free from regulated pests and diseases. This season, 95 lots were inspected.

Elongate Hemlock Scale

Effective July 1, 2023, Wisconsin enacted an exterior quarantine on elongate hemlock scale (EHS). Under the new quarantine, any Wisconsin business that imports regulated plant materials from an EHS infested area is required to sign a DATCP compliance agreement or obtain a phytosanitary certificate from the state of origin. Fourteen businesses signed EHS compliance agreements in 2023.

During annual Christmas tree lot inspections, elongate hemlock scale was found at three lots on fir trees imported from the eastern U.S. In addition, balsam woolly adelgid was found at two lots. Plant material infested with these two regulated pests was ordered to be removed from sale and destroyed.

Christmas Tree Inspections Conducted and Certificates Issued 2021-2023

Year	Growers Licensed	PHCs Issued	Phytos Issued	Fields Inspected	Lots Inspected
2021	374	120	42	606	74
2022	374	90	42	519	67
2023	374	93	28	509	95

Top 10 Pests, Diseases, and Abiotic Issues Found in Christmas Tree Fields in 2023

Pest	Count	Disease	Count	Abiotic	Count
Balsam twig aphid	175	Broom rust of fir	58	Mortality	84
Balsam gall midge	91	White pine blister rust	29	Drought or heat stress	64
Deer damage	91	Needle cast	14	Chlorosis	11
Pine needle scale	21	Rhizosphaera needle blight fir	18	Herbicide injury	10
Pine leaf beetle	18	Phytophthora/Pythium root rot	18	Environmental injury	8
White pine weevil	16	Lirula needle cast	12	Mechanical injury	6
East spruce gall adelgid	11	Rhizosphaera needle cast spruce	11	Winter injury	6
Fir coneworm	10	Needle blight	11	Chill/cold injury	6
Pine bark adelgid	10	Eastern (pine-oak) gall rust	8	Compacted roots	4
Spruce budworm	10	Brown spot needle blight	7	Frost damage	2

Export Certification Program

The Export Certification Program inspects and certifies plant products for international export and interstate shipment. Program specialists check country and commodity-specific plant pest regulations and assist customers in understanding phytosanitary requirements for over 200 countries. The program facilitates the export of pest-free Wisconsin plant products.

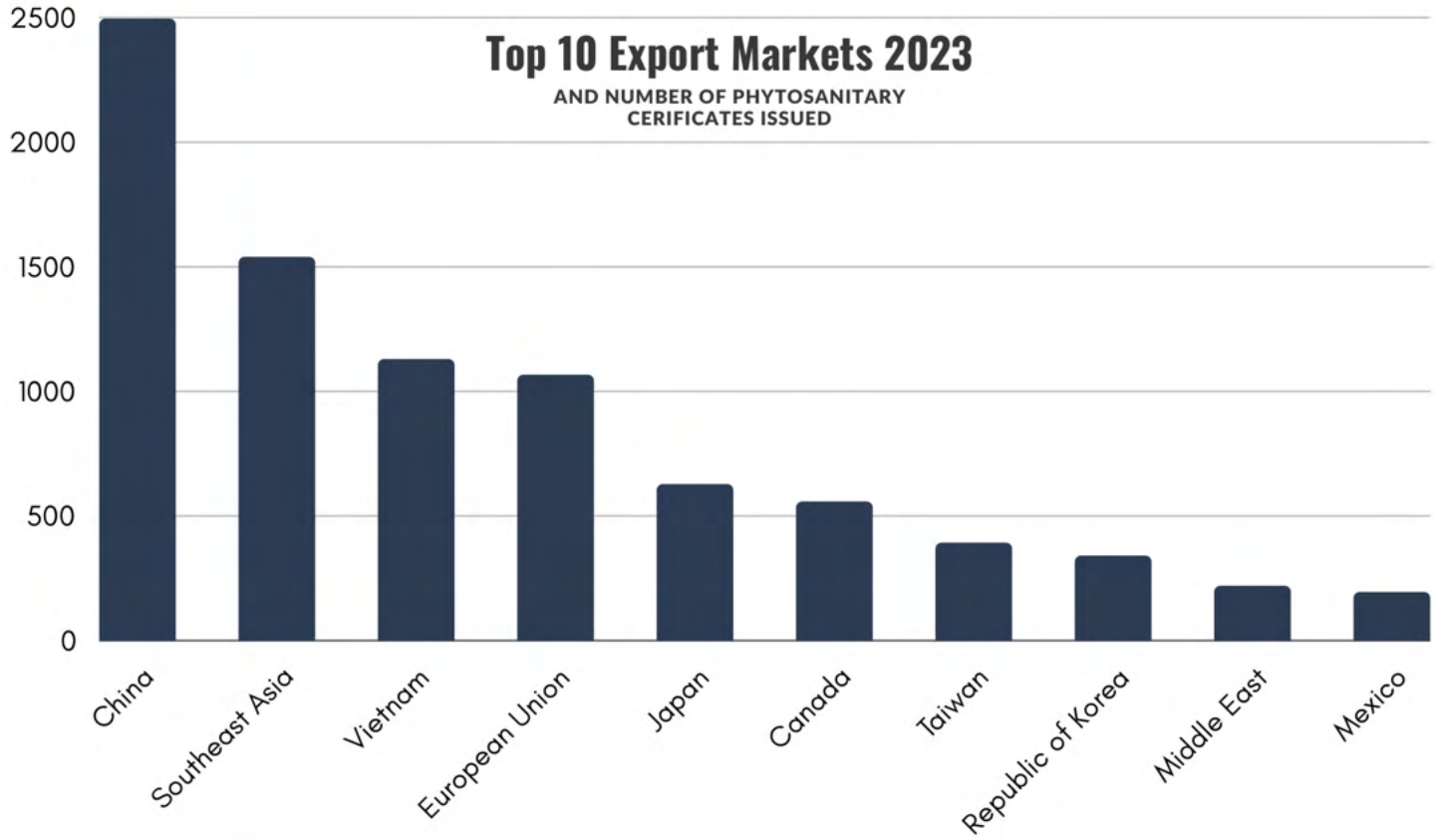
Exports certified by the program in 2023 exceeded $1 billion and were shipped to 84 countries. The total number of phytosanitary certificates (phytos) issued was 8,217, down from 8,323 in 2022. China and Southeast Asia (Indonesia, Malaysia, Philippines, Thailand) were the top two destinations for exports, while Vietnam rose to third place. Grain exports, including soybean, distillers dried grain, and corn, accounted for 52% of the total commodities certified this year, followed by wood products at 37%. No Wisconsin commodities were rejected or destroyed at destination ports in 2023.

2023 STATS

$1 BILLION
IN EXPORTS CERTIFIED IN 2023

84
DESTINATION COUNTRIES

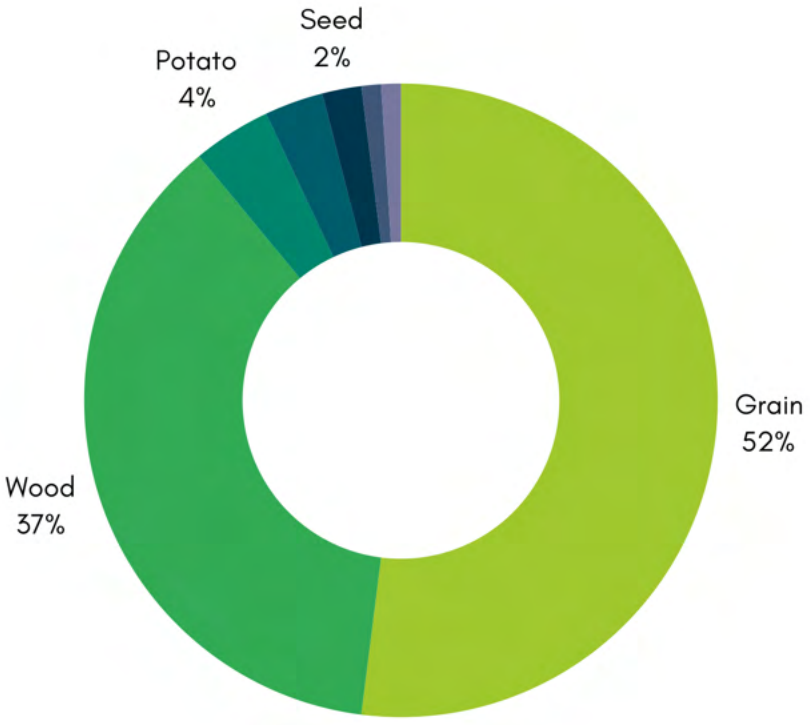
8,217
PHYTOS PRINTED



Federal and State Phytos Issued 2022 & 2023

Program staff printed and issued 8,217 phytosanitary certificates in 2023, a slight decrease from 8,323 certificates in 2022. The total number of applications processed was 11,056, also lower than 12,136 applications processed the year before.

Application or Certificate Status	2022 Number of Applications	2023 Number of Applications
Printed	8,323	8,217
Replaced	2,571	1,758
Voided	1,190	1,025
In Progress	125	162
Returned	21	22
Canceled	52	56
Applications Processed	12,136	11,056



Top Exports

Grain exports, including soybeans and corn, accounted for 52% of the total certificates issued in 2023, followed by wood products (logs, lumber, and veneer) at 37%. Other major exports this year were agricultural seed, potatoes, cranberries, and wheat.

Export Certification Program

Log and Lumber Inspections

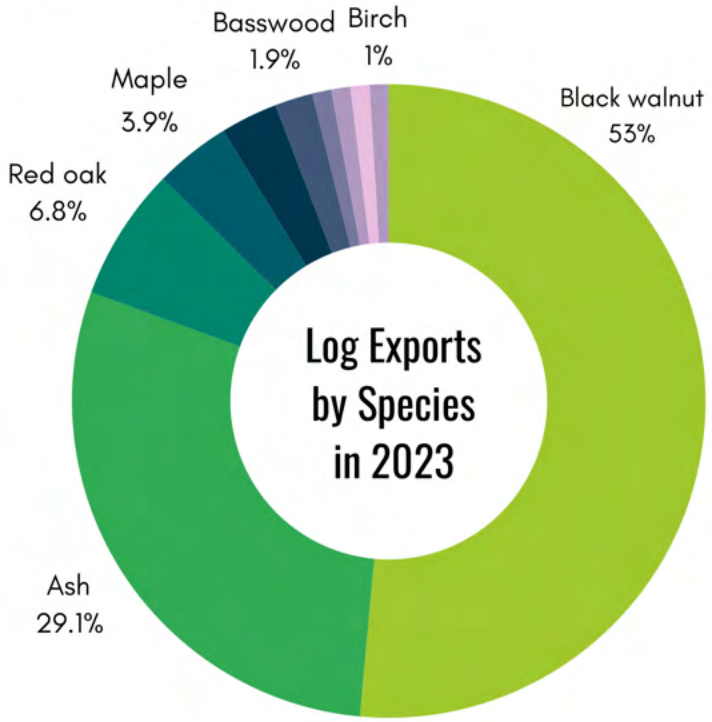
Inspections conducted in 2023 to support export certification included logs and kiln dried lumber. Two hundred and eighty-nine log inspections (127,492 logs) were conducted and 39 kiln dried lumber compliance agreements were signed. Compliance agreements specify actions or best management practices exporters must follow to meet the requirements of receiving counties. Companies that sign agreements benefit from expedited certification of overseas lumber shipments.

Seed Field Inspection and Laboratory Testing

Agricultural, horticultural, and specialty crops grown for seed and exported globally are inspected during the growing season for regulated plant pests. Field inspection and lab testing of the standing crop before harvest is a service provided by DATCP to Wisconsin seed producers to meet domestic and foreign phytosanitary requirements.

This year, 79 seed fields totaling 828 acres were inspected for 21 seed companies and growers. DATCP's Plant Industry Bureau Lab tested 120 samples, an increase from 92 samples tested in 2022. A total of 684 tests for 108 different plant pathogenic bacteria, fungi, viruses, and nematodes were performed on the 120 samples. The regulated pathogens detected during 2023 phytosanitary testing—Goss's wilt (four fields), wheat streak mosaic virus (two fields), gray leaf spot (one field), brown spot (one field), Northern corn leaf blight (two fields), soybean cyst nematode (one field)—are all known to occur in Wisconsin.

Seed produced in Wisconsin was exported to 26 foreign countries in 2023. The top five export destinations were Argentina, Brazil, Canada, Chile, and Mexico.



Phytosanitary Testing for Seed Fields 2023

Crop	No. Samples	No. Tests Per Sample	No. Pathogens
Blueberry	39	3	None
Corn	55	62	***
Garlic	1	1	None
Melon	2	5	None
Oats	1	4	None
Onion	1	17	None
Pepper	3	2	None
Soybean	3	7	SCN (1)
Squash	2	3	None
Sunflower	1	2	None
Tomato	2	2	None

***Goss's wilt (4 fields), wheat streak mosaic virus (2 fields); gray leaf spot (1 field); brown spot (1 field; Northern corn leaf blight (2 fields); SCN (1 field).

Export Certification Program

Wisconsin Potato Exports to Mexico

In 2023, three Wisconsin companies signed federal compliance agreements to begin exporting potatoes to Mexico. The U.S. and Mexico reached an agreement in 2021 to expand market access for U.S. potatoes beyond the previous 26 kilometer border restriction, following more than 20 years of negotiations. DATCP issued 77 phytosanitary certificates for 3.2 million pounds of table stock and processing potatoes to Mexico this year. The 15 table stock shipments were inspected by the Plant Industry Bureau, while 62 shipments of processing potatoes were inspected by DATCP Fruit and Vegetable Inspection Unit staff.

The U.S. potato industry estimates that access to all of Mexico for fresh U.S. potatoes will provide a market potential of $250 million per year, in five years. The USDA had worked for years on a resolution to this issue.

Potato Program

The Potato Program includes potato rot nematode inspections, late blight response, and coordination of the Wisconsin Seed Potato Certification Program (WSPCP) with the University of Wisconsin-Madison.

In March 2023, as part of the State National Harmonization Program (SNHP), Plant Industry staff conducted the annual audit of the WSPCP at the Wisconsin Seed Potato Tissue Culture Laboratory. Lab capabilities, virus testing procedures, and 2022 farm records for two certified seed potato producers were audited to assess conformity with ATCP 156. During the audit, UW staff provided a tour of the tissue culture lab and satisfactorily confirmed processes for growing plantlets and transporting to the State Farm for eventual sale to Wisconsin potato producers as foundation seed. Virus and disease testing procedures conducted at the UW Russell Labs, and winter test visual inspection procedures, were reviewed and met standards specified in Code.

Program staff also conducted fall inspections for potato rot nematode (PRN), *Ditylenchus destructor*, in 2023. Potato rot nematode is a quarantine pest which occurs in localized areas of Asia, Europe, and North America. Wisconsin is one of 10 states where PRN is found and there are 3,049 acres that have a history of infestation (see table). Potato fields prioritized for PRN inspection include fields entering the WSPCP and previously infested fields with a current crop of potatoes. Fifteen fields totaling 571.7 acres were inspected for PRN in 2023. All 15 of the fields were new to seed potato production and showed no evidence of PRN. Potato rot nematode has never been reported or intercepted in-state or out-of-state in seed potatoes or commercial potatoes from Wisconsin.

History of PRN in Wisconsin 1953-2023

County	Current Status	Acres	Fields
Forest	Released/not used	15	01
Kenosha	Released/not used	01	01
Langlade	Infested	442.3	19
Langlade	Released/not used	122.5	08
Langlade	Released/certified seed	1697.4	50
Langlade	Released/table stock	613.3	24
Lincoln	Released/certified seed	37	01
Manitowoc	Released/certified seed	9.3	01
Marathon	Infested	8.4	01
Marathon	Released/certified seed	64.5	02
Portage	Released/table stock	38.2	01

Hemlock woolly adelgid I alleghenyfront.org

Forest Pest Regulatory Program

The Forest Pest Regulatory Program is responsible for ensuring compliance with state and federal quarantine requirements governing the movement of nursery stock and forest products that may harbor regulated pests. Through firewood inspection and certification, as well as education and outreach to members of the nursery and forest products industries, the program works to prevent the introduction and spread of regulated pests such as elongate hemlock scale, hemlock woolly adelgid, mountain pine beetle, and spongy moth. In 2023, the program signed 82 DATCP forest pest compliance agreements and certified 40 firewood dealers.

Forest Pest Quarantine Permanent Rule Update

On July 1, 2023, permanent rule changes to the State of Wisconsin Administrative Code Chapter ATCP 21 went into effect. The rule changes rescinded quarantines for pine shoot beetle (ATCP 21.12), emerald ash borer (ATCP 21.17), and thousand cankers disease (ATCP 21.21); revised language for hemlock woolly adelgid (ATCP 21.16) and *Phytophthora ramorum* (ATCP 21.19) exterior quarantines; and created a new exterior quarantine for elongate hemlock scale (ATCP 21.23).

In anticipation of the elongate hemlock scale (EHS) quarantine, staff developed a guidance publication outlining Wisconsin's new regulations and sent compliance agreements to nurseries and Christmas tree growers and dealers known to import conifers from infested areas.

DATCP inspectors have intercepted live EHS on imported fir Christmas trees, fir holiday decor, and hemlock nursery stock on several occasions. To date, EHS has not been found in Wisconsin's forests or Christmas tree fields.

Forest Pest Regulatory Program

Firewood Certification

The movement of firewood is regulated in Wisconsin by quarantines and DNR, federal, and Tribal firewood rules. The spongy moth quarantine prohibits the movement of firewood from the state's 53 infested counties to non-quarantined counties or states. Rules established by the DNR prohibit firewood in Wisconsin state parks and other state-managed lands from locations more than 10 miles away. Firewood bearing a DATCP-certified label is exempted from this regulation.

Under the voluntary Firewood Dealer Certification Program, anyone producing at least 20 cords of firewood annually may apply for certification by completing an application form, obtaining an inspection, and by using an approved treatment method such as heat treatment, seasoning, or an alternative method approved by DATCP. Firewood that has been inspected and certified receives the DATCP-certified label. As mentioned, 40 firewood dealers were certified in 2023.

Forest Pest Regulatory Compliance Agreements by Industry in 2023

Regulated Pest	Nursery	Christmas Trees & Evergreen Décor	Other Forest Products
SM[1]	3	5	33
EHS[2]	7	7	0
HWA[3]	26	0	0
MPB[4]	NA	NA	1

1 Spongy moth; 2 Elongate hemlock scale; 3 Hemlock woolly adelgid; 4 Mountain pine beetle.

Spongy moth females laying eggs I DATCP

Forest Pest Regulatory Program

Forest Pest Outreach

Program staff worked throughout the year to raise awareness about established and emerging invasive forest pests. Following the April 2023 addition of Douglas County in northwestern Wisconsin to the spongy moth quarantine, extensive outreach was conducted to raise awareness of the quarantine expansion. Efforts included an in-person spongy moth regulatory training completed by 70 forest products industry personnel, a postcard mailing to green industry businesses in the newly regulated area, and an online spongy moth training completed by 24 people.

Outreach also involved event exhibits, weekly social media posts, magazine and e-news articles, press releases, media interviews, print materials, and billboards. The spotted lanternfly (SLF) was another major emphasis, with billboard campaigns carried out in Milwaukee (two billboards), Racine, and Washington counties for the third year in a row.

A targeted digital SLF billboard in Racine County in southeastern Wisconsin ran during the SLF swarming and mating period in September. The four billboards generated an estimated 3.8 million impressions based on road traffic data. Additionally, a SLF industry training video was developed and posted to slf.wi.gov. Other pests highlighted in this year's forest pest outreach work were Asian longhorned beetle, elongate hemlock scale, and hemlock woolly adelgid.

Spotted lanternfly billbord I DATCP

Seed Labeling Program

The Seed Program monitors agricultural, lawn, and vegetable seed to ensure labeler and dealer compliance with standards prescribed by the Wisconsin Seed Law. Seed that does not meet label guarantees or conform to purity, germination rate, and noxious weed seed restriction standards may be removed from the marketplace and labelers may be subject to penalties. Seed program inspectors perform a range of duties, such as evaluating labels for compliance, issuing stop sale orders, and collecting samples for analysis.

In 2023, DATCP licensed 725 seed labelers. Program staff conducted 142 inspections and collected 371 seed samples, which compares with 268 inspections and 409 samples in 2022. Forty-five new licenses were processed this year, while 52 seed labelers from 2022 claimed "out of business" or canceled their licenses.

Seed industry violations were the highest in 10 years (since 2013). Twenty-five violations were found in the 317 samples, for a 6.7% violation rate. Six of the violations were categorized as minor and 19 were considered serious. Five of this year's samples containing *Amaranthus* spp. seeds were sent for further determination. None were identified as the prohibited invasive weeds Palmer amaranth or waterhemp. The following compliance actions were taken: (1) nine seed lots were relabeled, (2) six lots were removed from sale by the labeler, (3) three lots were returned to the labeler, (4) one lot was ground for feed, and (5) three lots are pending. The table below summarizes the number of inspections completed, samples collected, and violation rates in the last 10 years.

Seed industry violations reached the highest level in 10 years. A total of 25 violations were found in the 371 samples, for a 6.7% violation rate. Six of the violations were minor and and 19 were classified as serious. The 2023 violation rate is also well above the 10-year average of 5.2% and indicates a need for improvement in labeling compliance in 2024.

Ten-Year Seed Inspection Results 2014-2023

Year	Licensed Labelers	Labelers Inspected	Samples Collected	% Labelers Sampled	No. of Violations	% Violation
2014	730	207	341	12%	18	5.3%
2015	725	236	343	14%	16	4.7%
2016	728	219	374	16%	18	4.8%
2017	742	181	410	16%	22	5.4%
2018	743	192	371	15%	17	5.1%
2019	789	295	392	16%	26	6.6%
2020	821	39	*84	*	*	*
2021	797	175	368	12%	15	4.1%
2022	739	268	409	14%	16	3.9%
2023	725	142	371	12%	25	6.7%
10-Yr Ave	**754**	**195**	**375**	**14%**	**19**	**5.2%**

Pest Survey and Control Section

Spotted lanternflies I Arlutx73 Getty Images

The Pest Survey and Control Section conducts surveys for the early detection of exotic plant pests and diseases of economic and regulatory significance and responds to new pest introductions by initiating strategic control or eradication measures. Surveys supply information to the Plant Industry Bureau's regulatory programs and may be used to determine pest presence or absence, substantiate pest-free status, or to establish or revise a quarantine regulation. The section includes the Plant Industry Laboratory in Madison, which provides plant pest and disease diagnostic services to the bureau's regulatory and survey programs.

Pest Survey Programs

Plant Industry Bureau Lab

Forest Pest Survey

Spongy Moth Program

Commodity Crop Survey

Specialty Crop Survey

Plant Pest Permits

Plant Industry Bureau Laboratory

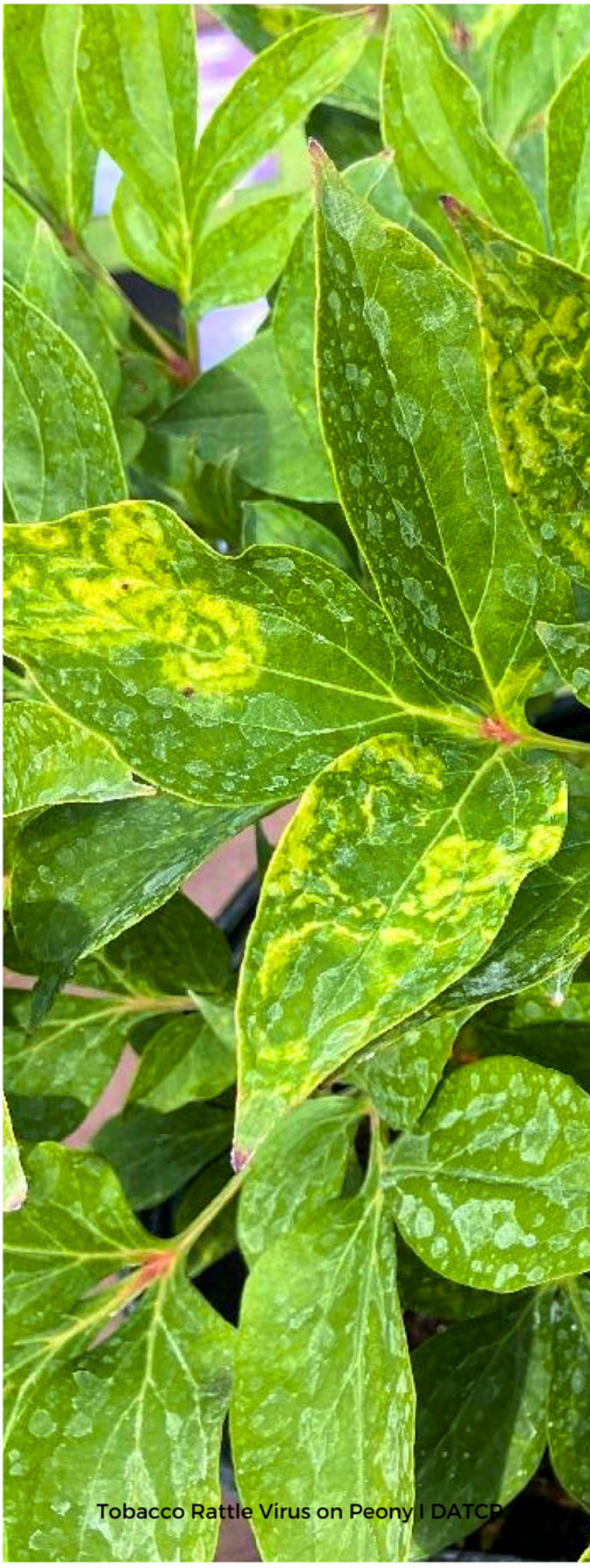
The Plant Industry Bureau Laboratory processed 626 plant samples for diseases and 50 samples for insect and mite concerns in support of DATCP's Christmas tree, Nursery, Pest Survey, Phytosanitary, Potato, and Agrichemical Management programs in 2023. In addition, 1,344 insect trap samples were screened for regulated and non-native pests. The lab performed 1,882 diagnoses on the 626 samples processed for diseases, using techniques including microscopy, culturing, enzyme-linked immunosorbent assay (ELISA), polymerase chain reaction (PCR), and sequencing to identify pathogens.

National Plant Diagnostic Network Member Lab

In 2023, the lab joined the National Plant Diagnostic Network (NPDN) as the member lab for the State of Wisconsin. The NPDN is a consortium of diagnostic labs in all U.S. states and territories that protect national plant health and agricultural security by providing efficient, accurate diagnostics of plant pests and pathogens. Since becoming an NPDN member lab, DATCP's plant pathologists have begun the process of achieving accreditation. Accreditation ensures NPDN laboratories meet core quality standards for strengthening readiness in performing timely detections, while reducing the risk of exotic pathogens and pest establishment.

New Surveys and Diagnostic Tests

During the 2023 season, plant pathologists at the lab conducted early detection surveys for tomato brown rugose fruit virus, potato spindle tuber viroid, and wheat blast. The results of these surveys are summarized on pages 32, 33, and 40. Early detection activities were accomplished with funding provided by a USDA-APHIS Cooperative Agricultural Pest Survey (CAPS) Program agreement.



Tobacco Rattle Virus on Peony | DATCP

Plant Industry Bureau Laboratory

In addition, the lab added a real-time reverse transcription polymerase chain reaction (RT-qPCR) diagnostic test for potato spindle tuber viroid in 2023. This assay was used to test tomato, potato, and pepper plant material collected during the USDA CAPS survey in Dane County in community gardens (page 40). The lab now offers 31 conventional PCRs, 11 RT-PCRs, 13 qPCRs, five RT-qPCRs, as well as other diagnostic tests.

Viruses of Nursery Ornamentals

Plant viruses continue to be a serious problem for nursery stock production. Besides lowering the vigor and commercial value of ornamental plants, many viruses can also be transmitted to agricultural crops. The Plant Industry Bureau Laboratory, in cooperation with DATCP nursery inspectors, have conducted sampling and testing for viruses in Wisconsin nurseries and greenhouses for the last 20 years.

This season, nursery inspectors collected 136 ornamental samples for virus testing at the lab. Tobacco rattle virus (TRV) was detected most often, with 62 positives (mainly in astilbe, bleeding heart, hosta, and peony). Potyviruses were confirmed in iris, rose, sedum, and wisteria, for a total of nine positive samples. In addition, hosta virus X was found in nine hosta samples; cucumber mosaic virus (CMV) was detected in astilbe, lobelia, and monkshood; and Ilarviruses were confirmed in five samples.

Other virus finds in 2023 included impatiens necrotic spot virus in begonia, alfalfa mosaic virus in phlox, and tomato ringspot virus in lily. Several plants co-infected with two viruses were also observed:

- Astilbe 'Fanal' with Ilarvirus and TRV
- Astilbe 'Bridal Veil' with Ilarvirus and TRV
- Joe-Pye weed with Ilarvirus and TRV
- Lobelia 'Monet Moment' with CMV and TRV

Laboratory test results are summarized in the accompanying table.

Viruses on Ornamentals Diagnosed at the Plant Industry Bureau Lab in 2023

Virus Name	No. of Positives	Percent Positive	No. of Plants Tested
Alfalfa mosaic virus	1	5%	21
Arabis mosaic virus	0	0%	28
Clematis chlorotic mottle	0	0%	2
Cucumber mosaic	3	5%	58
Hosta virus X	9	56%	16
Ilarvirus group	5	8%	63
Impatiens necrotic spot	1	3%	29
Potyvirus group	9	23%	40
Tobacco mosaic	0	0%	28
Tomato ringspot	1	9%	11
Tobacco rattle	62	55%	111
Tobacco ringspot	0	0%	6
Tomato spotted wilt	0	0%	36

Nematode Survey

The Plant Industry Bureau Lab also conducted a survey of ornamental nursery stock for root-knot (*Meloidogyne* spp.) and root lesion (*Pratylenchus* spp.) nematodes this year. The plant-parasitic nematodes in these genera are known for their broad host-ranges and capacity to cause disease in hundreds of agricultural and horticultural plants worldwide. Of the 94 samples screened for nematodes at the lab, eight astilbe samples were positive for root-knot nematodes and six plant samples were positive for root lesion nematodes. The ornamentals infested with root lesion nematodes were astilbe (3), barrenwort, (2), and bleeding heart (1). In addition, foliar nematodes (*Aphelenchoides* spp.) were detected on three varieties of hostas, including 'Javelin', 'Lakeside Banana Bay', and 'Tickle Me Pink'.

Soil-borne root-knot and root lesion nematodes may be spread by contaminated tools and soil, natural movement through the soil, and by contaminated plant propagules. Although nematode infestation may not be directly lethal to the host plant, their feeding interferes with proper root function (i.e., water and nutrient movement), reduces plant vigor, and root lesions or damage can become an infection point for other plant pathogens. It is important for nursery industry workers and consumers to be aware of the prevalence of nematodes in the nursery trade and to monitor plants for their signs and symptoms.

Leafy Gall Disease

Leafy gall disease caused by the bacterium *Rhodococcus faciens* was detected on Wisconsin nursery ornamentals for the first time in many years. Diagnostics were performed at the Plant Industry Bureau Lab, with assistance from the UW-Madison Plant Disease Diagnostics Clinic. Two daisy plants and one petunia from retailers in Kenosha, Ozaukee, and Racine counties tested positive for leafy gall in 2023.

Astible infected with virus | DATCP


Hosta with foliar nematode | DATCP

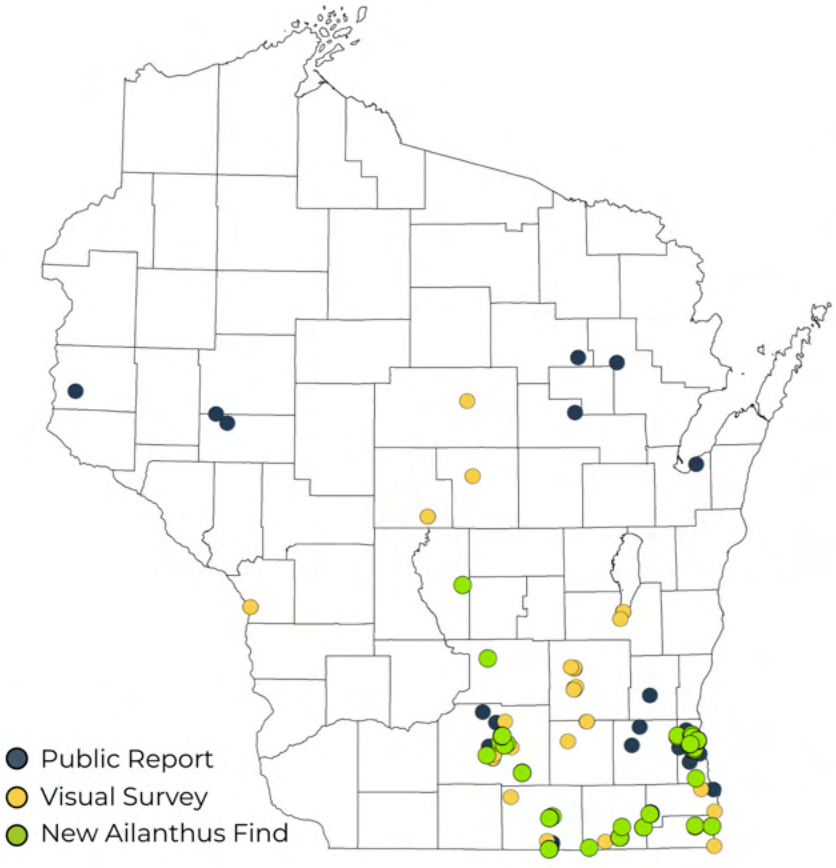

Leafy gall on daisy | DATCP

Forest Pest Surveys

Spotted Lanternfly

DATCP continued early detection efforts for spotted lanternfly (SLF) in 2023, conducting 48 visual surveys in 13 counties. Program staff walked a total of 66.7 miles in areas thought to pose a high risk of introduction, surveying trees, objects, and structures for signs of SLF. Although no SLF life stages were found during these visits, DATCP surveyors documented 106 new records of the insect's preferred host, *Ailanthus altissima* (tree-of-heaven).

Additionally, staff responded to 36 suspected SLF sightings reported by the public to DATCP's online reporting form on **slf.wi.gov**. While most of these reports yielded no signs of SLF, two independent accounts from Dodge County contained valid photos of single, dead SLF adults.



Map 3. Spotted lanternfly surveys 2023

Follow-up surveys in the areas surrounding these reports found no evidence of SLF, leading to the conclusion that the specimens likely hitchhiked from another state in freight shipments and were dead on arrival to Wisconsin. The locations of these reports, in combination with an expanding map of known tree-of-heaven locations throughout the state, will inform survey plans for the 2024 survey season.

As of December 2023, living SLF have not yet been found in Wisconsin. After recent detections in nearby Chicago, however, early survey efforts and public vigilance for this pest are more important than ever.

Pine Pest Commodity Survey

Early detection work conducted by DATCP in 2023 also included a survey for nine national priority insect pests that pose a threat to Wisconsin's pine resource. Three defoliator moths (pine-tree lappet, Siberian silk moth, and nun moth) and six wood-boring beetles (large pine weevil, six-toothed bark beetle, European spruce bark beetle, black fir sawyer, black spruce beetle, and brown spruce longhorned beetle) were the selected targets.

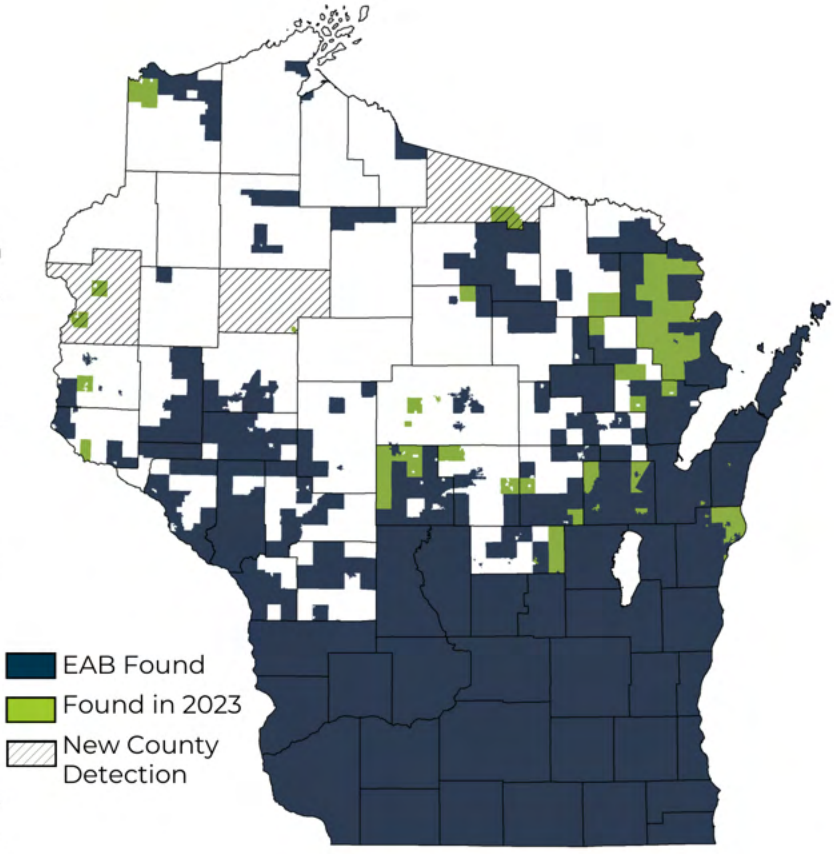
Surveyors set a total of 75 traps at 15 southeastern industrial sites. The trap sites were high risk introduction pathways, such as transportation corridors and industrial properties, and spanned 14 counties. Laboratory screening of the 585 samples obtained from the traps yielded no suspects of the national priority pests targeted in this survey.

These negative findings align with the results of a similar 2021 pine pest trapping effort that also found no evidence of the nine target pests in the major metropolitan areas of southeastern Wisconsin.

Forest Pest Surveys

Emerald Ash Borer

In 2023, DATCP confirmed first detections of emerald ash borer (EAB) in Polk, Rusk, and Vilas counties. With these three additions, EAB has been detected in 69 out of Wisconsin's 72 counties (96%) in the 15 years since it was first found in the state. Additionally, validated reports from DATCP staff, partner agencies, and observant citizens led to 55 municipal detections in counties where EAB has already established. This marks a 74% decrease from 2022 and highlights a downward trend that is expected to continue as EAB spreads into the more sparsely populated northern region of the state.



Map 4. Emerald Ash Borer Detections 2008-2023

Velvet Longhorned Beetle

Surveys for velvet longhorned beetle (VLB) have been conducted in Wisconsin since 2017, following the first detection in Milwaukee County. For the 2023 season, trapping was carried out at 14 sites across seven counties along waterways and in urban areas. The traps were set in counties with no prior detections. The survey resulted in the capture of one VLB in a Dodge County trap, a new county record.

In seven years, early detection surveys have collected VLB in 13 southeastern Wisconsin counties (using cross-vane panel traps with pheromone lure). The pest potential of this introduced Asian wood borer remains unknown. Velvet longhorned beetle has been found in 14 states and is established in Illinois, Wisconsin, and Utah. In Wisconsin, it has been intercepted in rustic hickory-style log furniture made in China (in 2016) and collected in survey traps. To date, there have been no environmental or economic impacts attributed to VLB.

Walnut Twig Beetle Survey

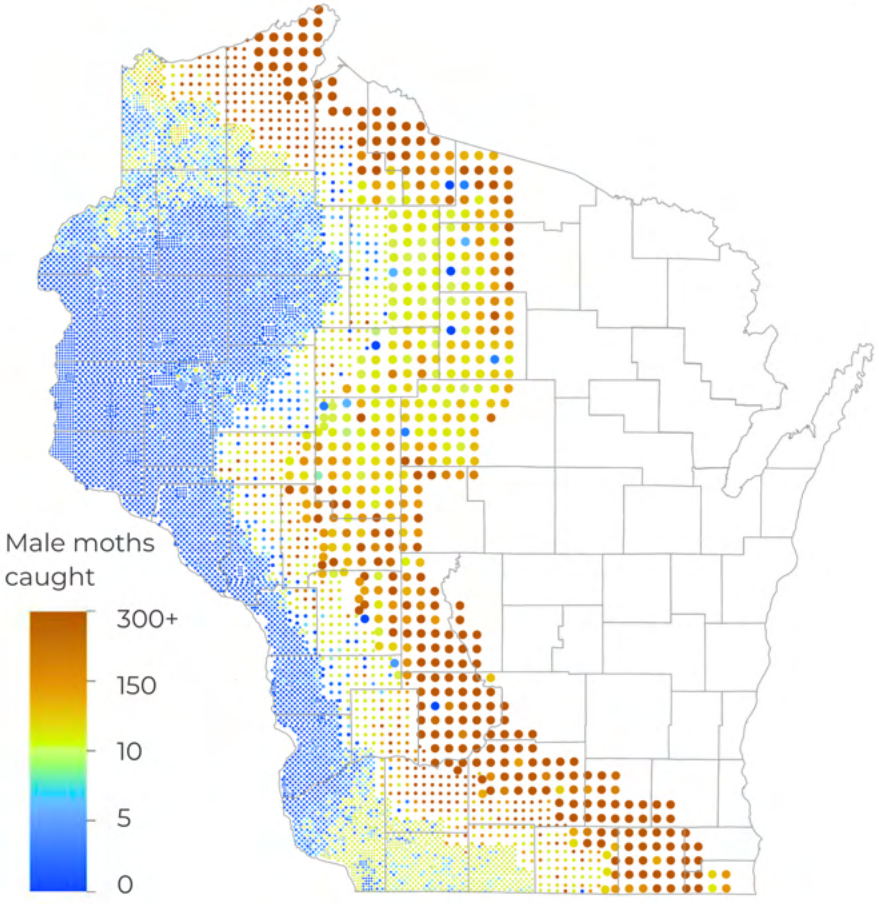
Annual presence/absence surveys for the walnut twig beetle (WTB) have been conducted in Wisconsin for over a decade. The beetle is native to the western U.S., but in recent years has been found east of the Mississippi, though not in Wisconsin. As a vector of *Geosmithia morbida*, the fungus that causes thousand cankers disease of walnut, WTB is a regulated pest for walnut exports.

This season, monitoring was conducted at four sawmills where 11 multi-funnel traps were set in log yards holding walnut. Walnut twig beetle was not found in the 59 trap samples processed.

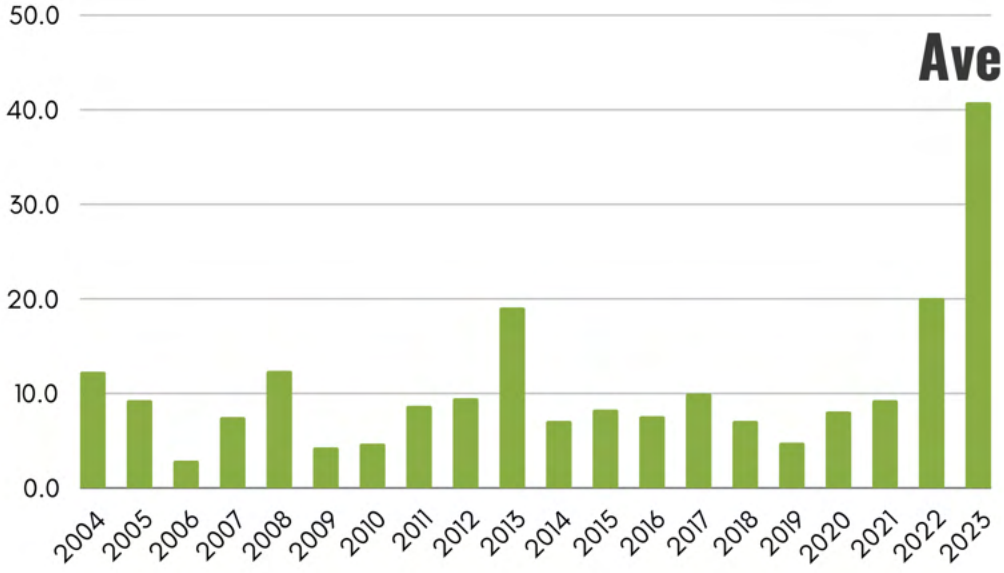
Spongy Moth Program

The Slow the Spread of Spongy Moth Program is a collaborative interagency effort between DATCP, USDA-Forest Service, and government agencies in 11 participating states. The goal of the program is to reduce the rate of spongy moth spread by detecting and treating isolated pockets in which spongy moth is advancing westward. This season, 25 staff contributed to trapping and treatment efforts in Wisconsin, including several who have been with the program for nearly three decades.

The state total male spongy moth catch increased for the fourth consecutive season to a 20-year high in 2023. The Spongy Moth Program recorded an annual catch of 397,415 male spongy moths in 9,733 traps, nearly double the 201,549 moths collected in 2022, quadruple the 2021 catch of 99,847 moths, and one of the highest totals in the 53-year history of trapping in Wisconsin. The 2023 state average count was 40.8 moths per trap.



Map 5. Spongy Moth Trapping Survey Results 2023



Ave No. Moths per Trap 20-Year Trend

Annual average moth counts have ranged from as high as 41 moths per trap in 2023 to less than one per trap, with a 20-year average of 11 per trap

Spongy Moth Program

These patterns reflect an outbreak phase that has been building since a low population was recorded in 2019. Although population increases were most pronounced in areas which have been generally infested with spongy moth for many years (i.e., eastern and central Wisconsin), markedly high rates of spread were also documented in the far northwest and southwest corners of the state where spongy moth is not yet widely established. Based on fall egg mass surveys, these high captures are thought to be spillover of transient male moths from heavily infested adjacent counties and not stable, reproducing populations.

Spongy Moth Aerial Treatment Program

The Spongy Moth aerial spray program treated outlier populations in 37 sites identified during the previous trapping season, totaling 86,927 acres. Btk aerial spray applications began May 17 and ended May 31. Foray Btk was applied to 7,411 acres at 17 sites in western Wisconsin. As a result of favorable dry weather, the treatments were completed as planned with only one delay due to fog.

U.S. Forest Service mating disruption aerial applications occurred June 26-July 12. A total of 79,516 acres were treated with SPLAT GM-Organic at 20 sites in western Wisconsin. Hazy conditions and reduced visibility from Canadian wildfire smoke caused delays on three separate days, marking the first time in program history that spray operations were stalled by smoke.

The population growth recorded in the last four years has been driven by weather factors such as warm, dry spring conditions and mild winters, which have limited the impacts of larval diseases and winter egg mass mortality, respectively. As a result, more caterpillars have been hatching and surviving to adulthood each year. Outbreaks occur approximately every 7-10 years in areas infested with spongy moth, and usually persist for 2-4 years before populations collapse.

Spongy Moth Trapping and Treatment Summary 2014-2023

Year	Number of Traps	Number of Moths	Ave. Moths per Trap	Acres Treated
2014	13,105	92,786	7.1	168,113
2015	11,712	97,505	8.3	232,668
2016	11,386	86,462	7.6	201,207
2017	10,940	109,333	10.0	154,947
2018	10,748	76,447	7.1	7,288
2019	10,962	52,396	4.8	113,911
2020	10,308	83,720	8.1	152,978
2021	10,787	99,847	9.3	88,977
2022	10,044	201,549	20.1	121,774
2023	9,733	397,415	40.8	86,927

53-YEAR PROGRAM STATS

1,060,124
TRAPS SET

6,195,644
MOTHS CAPTURED

4,509,419
ACRES TREATED

Cereal leaf beetle I Cornell IPM

Commodity Crop Surveys

Surveys Conducted in 2023

Pest survey specialists monitored corn, soybean, and wheat fields in 2023 for several invasive national priority pests that are currently not known to occur in Wisconsin or have limited distributions in the state. Survey work was funded by the USDA Cooperative Agricultural Pest Survey (CAPS) Program and DATCP and conducted from May through August. Field crop surveys also collected data on the leading economic pests of concern to Wisconsin crop producers, such as the cereal leaf beetle and true armyworm.

Small Grains Survey

Surveys in wheat fields across the southern and east-central areas of the state in June found low insect counts, and very few foliar disease symptoms due to prevailing dry conditions.

During the two-week period from June 8-21, DATCP specialists sampled 50 fields in the following counties: Brown, Calumet, Dane, Dodge, Door, Fond du Lac, Kewaunee, Manitowoc, Sheboygan, and Winnebago. These counties contain the majority of the wheat acreage in the state. In each field, sweep net samples for cereal leaf beetle, aphids, and true armyworm larvae were made at four sites (100 sweeps total per field). A sample consisting of 20 wheat heads and leaves was also collected for wheat blast testing at the DATCP Plant Industry Bureau Laboratory. Wheat blast (caused by the fungus *Magnaporthe oryzae* Triticum pathotype) was first reported in Brazil and has led to locally severe epidemics with up to 100% crop loss in affected fields in South America (Argentina, Bolivia, Brazil, Paraguay), as well as in parts of Africa and Asia.

Commodity Crop Surveys

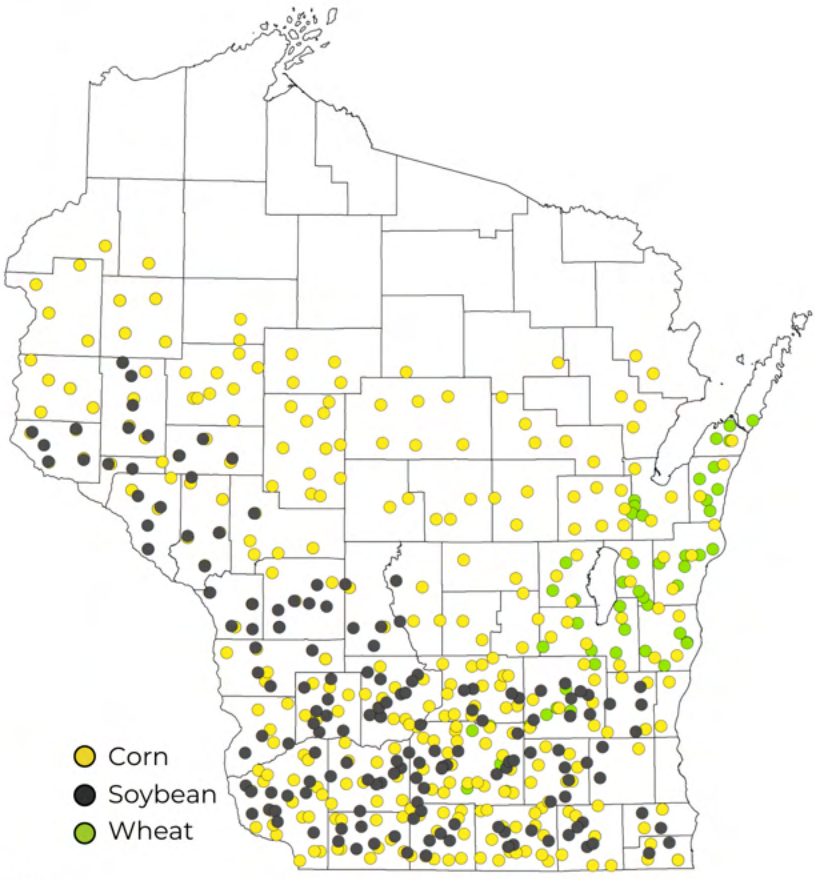
Small Grains Survey continued

The table below shows the results of wheat pest sampling. English grain aphids were present at low to moderate levels in all but one of the fields, true armyworm larvae were found in low numbers in 28 of the fields, and cereal leaf beetle was collected from 17 of the fields. One exceptional Winnebago County site had a cereal leaf beetle count of 17 adult beetles per 100 sweeps and larvae were abundant on wheat foliage. The surveyor estimated 10% of plants in the field had defoliation and flag leaf feeding. Overall, insect counts were below economic levels and damage was not observed. All wheat samples tested negative for the wheat blast pathogen.

DATCP Wheat Pest Survey Results 2023
Average Number of Insects per 100 sweeps

Pest Name	Positive Fields	Highest Count	Survey Average	Damage Noted
Cereal leaf beetle	17	17	1	1 field*
Bird cherry-oat aphid	20	27	2	No
English grain aphid	49	224	55	No
True armyworm	28	15	2	No

Survey was conducted in 50 wheat fields in southern and eastern Wisconsin. Sample size of 100 sweeps per field.
*Cereal leaf beetle damage noted in Winnebago County.



Map 6. Commodity Crop Surveys 2023

Soybean Gall Midge

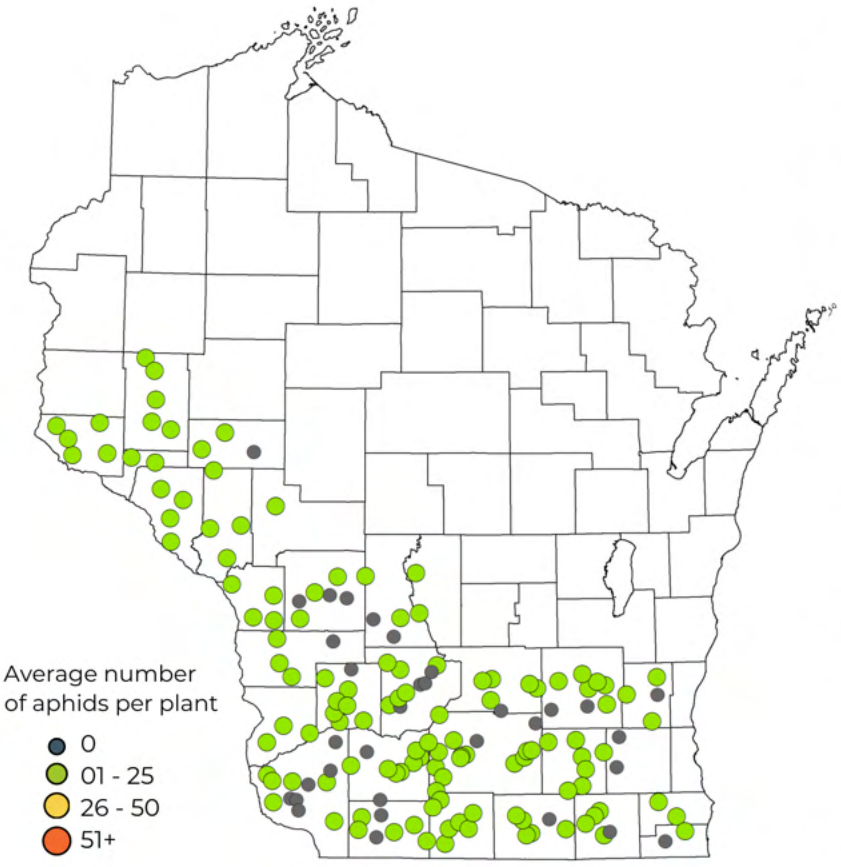
DATCP's Pest Survey Program sampled 158 soybean fields in southern and western Wisconsin in 2023 as part of a multistate collaboration with the UW-Madison and the North Central Soybean Research Program to track the expanding distribution of the soybean gall midge (SGM). This new economic insect pest of soybeans has been found in 164 counties in six Midwestern states since 2018: Iowa, Kansas, Minnesota, Missouri, Nebraska, and South Dakota, including eight new counties this season. It is unknown if SGM is native or invasive to the U.S.

Soybean gall midge has not yet been found in Wisconsin. The closest known infestations are in Rice County in south-central Minnesota, just 70 miles west of the Mississippi River. In Iowa, SGM has been confirmed in nearly half of the 99 counties (48 total). Based on its current proximity, it is anticipated that SGM will reach Wisconsin in the near future.

Commodity Crop Surveys

Soybean Aphid

Populations recorded during the annual survey were the lowest on record for Wisconsin. All 158 soybean fields sampled from July 5-August 30 had average counts below 25 aphids per plant and no surveyed field showed an above-threshold population of 250 or more aphids per plant. The 2023 state average count was just three aphids per plant (30 per 100 plants), a decrease from six aphids per plant (60 per 100 plants) recorded in 2022 and even lower than previous all-time low average of five aphids per plant (50 per 100 plants) recorded in 2019.



Map 7. Soybean Aphid Survey 2023

Results of this season's effort suggest that aphid pressure was generally very low. It is unclear if the scarcity of aphids was most influenced by environmental conditions and natural predation and/or parasitism, or due to widespread application of foliar insecticide and fungicide tank mixes applied in the early reproductive stages of soybean growth. Research clearly shows that preventative tank mixes of fungicide and insecticide are rarely cost-effective, except in instances where scouting confirms that insect levels are above-threshold.

Japanese Beetle

Japanese beetle pressure on the 2023 soybean crop was lower than levels observed in the previous six years (2017-2022). Beetle counts recorded during the July-August soybean survey ranged from 1-82 beetles per 100 sweeps in 158 soybean fields examined, with a state average of seven per 100 sweeps. In 2022, the average was nine beetles per 100 sweeps and the 2021 average was 17 per 100 sweeps.

During 2023, the highest counts of 50 or more beetles per 100 sweeps were noted in the southwest district, which has been a consistent pattern over the last six years. Individual fields in Grant and Iowa counties had counts above 80 beetles per 100 sweeps and estimated defoliation levels exceeding the 20% economic threshold for this pest.

Despite a general decrease in Japanese beetle soybean defoliation, some areas of the state experienced heavy localized populations with severe damage to trees and landscape plants favored by the beetles. Reports indicate that beetle infestations have been particularly troublesome in north-central Wisconsin during the last two summers.

Commodity Crop Surveys

True Armyworm

Damaging, localized infestations of first-generation true armyworm larvae developed in southwestern Wisconsin in early June. Destructive feeding by armyworm caterpillars in corn fields, pastures, and in pasture-mix forages was observed during the week of June 8-14 in Grant, Iowa, Lafayette, and Vernon counties. A native plant nursery near Brodhead in Green County also reported that a 20-acre field of Virginia wild rye (*Elymus virginicus*) was completely defoliated by armyworms during the same week.

Pheromone trapping for true armyworm moths began in July, after damage by the first generation of armyworms had subsided. Captures of second- and third-flight moths in traps were very low. The true armyworm trapping network of 14 traps in Dane, Grant, Green, Iowa, Lafayette, and Rock counties collected an eight-week cumulative total of 185 moths in July and August (13 moths per trap average), with the highest weekly counts recorded July 7-28. Significant larval feeding was not observed after late June and only the first generation of armyworms was destructive this summer.

Corn Earworm

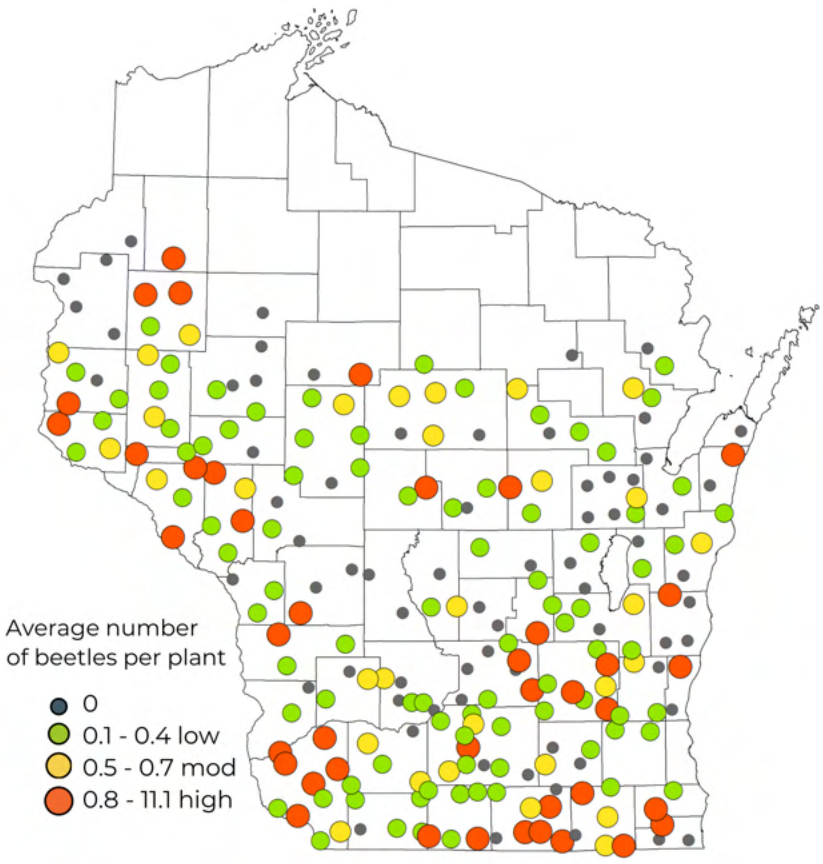
Corn earworm moth counts were far higher this season than in 2022 at most trap locations. The 2023 monitoring program captured a total of 13,996 moths in 12 traps, with the largest flights recorded during the two weeks from August 24-September 7. Compared to 2022 when 4,173 moths were collected in 13 traps, this year's total count was three times higher and corn earworm larvae were also more common during fall corn surveys. Corn earworm caterpillars were observed at 10% of corn sites checked in September and October. The pheromone trap location with this season's highest cumulative catch was Beaver Dam in Dodge County, where 4,545 moths, or nearly one-third of the 2023 total moth catch, were collected.

Corn earworm larva I DATCP

Commodity Crop Surveys

Corn Rootworm

Corn rootworm beetle counts decreased across much of Wisconsin in 2023 following two consecutive years of high pressure. The annual survey in August found a state average of 0.5 beetle per plant, a drop from 0.9 per plant in 2022 and 0.8 per plant in 2021. The largest decrease in adult rootworm counts was recorded in the east-central region, where the district average fell from 1.1 beetles per plant in 2022 to 0.2 beetle per plant in 2023. Levels also dropped sharply in the southwest district, from 1.3 last year to 0.5 in 2023. Corn fields with populations above the economic threshold of 0.75 beetle per plant comprised 18% of this year's 229 sites, compared to last year's 33%.



Map 8. Annual Corn Rootworm Beetle Survey 2023

In addition, the 2023 total count of 1,174 rootworm beetles was 40% lower than the 1,965 beetles tallied in 2022. Sixty-four percent (757 out of 1,174) of this season's beetles were the northern corn rootworm, which has been the predominant species in the state for the last 10 years in a row.

Although Wisconsin beetle populations decreased overall from the previous two seasons, areas of high rootworm pressure persisted in parts of the southern and western districts. Effective corn rootworm management in these higher-pressure regions requires a multiyear plan emphasizing regular crop rotation (out of a continuous corn cropping system), selection of a dual or triple mode of action Bt-rootworm (RW) trait corn seed product and, in some situations, the use of a soil-applied insecticide at planting—usually for corn products without Bt-RW protection. Crop rotation remains the most effective regulator of corn rootworm populations.

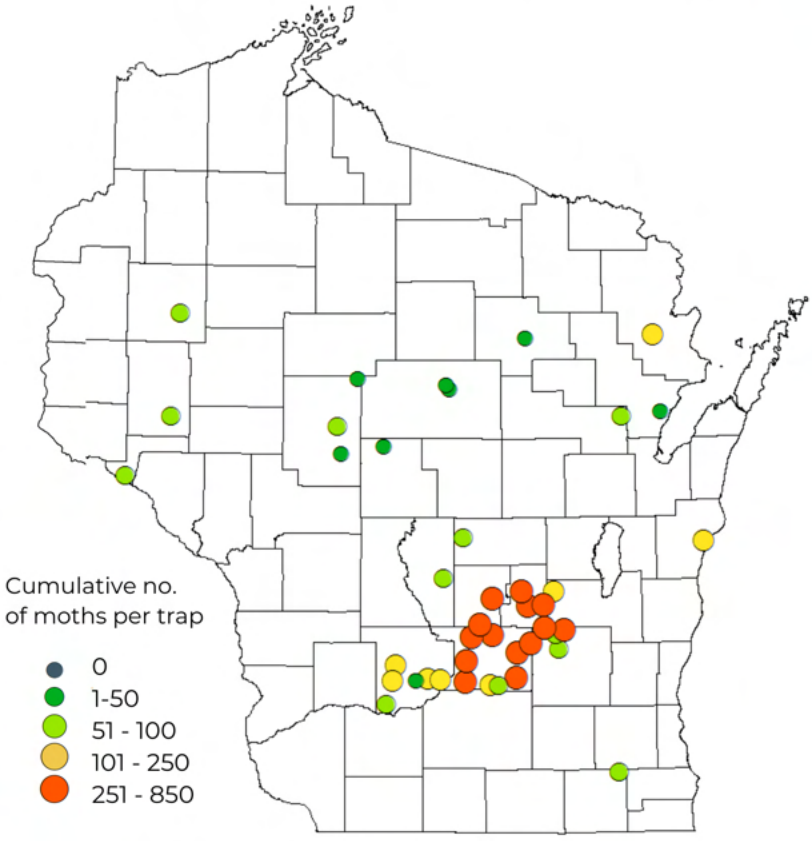
European Corn Borer

Larval populations were extremely low again in 2023. The state average count in 229 corn fields sampled this fall was 0.02 borer per plant (or two borers per 100 corn stalks), which is a decrease from the 2022 survey average of 0.05 borer per plant and only slightly above the all-time low average of 0.01 per plant recorded in 2018 and 2019. Eight of the state's agricultural districts showed averages less than or equal to last year's levels, while a negligible increase was noted in the central area. Larvae were absent from 95% of the fields sampled in September and October. The near-record low number of corn borers observed this year reflects the continued prevalence of Bt corn, which currently accounts for about 82% of the state's corn acres.

Western Bean Cutworm

Moth counts documented during the June to mid-August flight period were the highest in 19 years of surveys. The 2023 trapping program registered an average of 223 moths per trap (9,351 moths in 42 traps), far surpassing the previous survey record of 133 moths per trap (4,804 moths in 36 traps) set in 2022. One-third of the sites recorded cumulative captures above 250 moths per trap, while the highest individual count for the 10-week monitoring period was 850 moths near Princeton in Green Lake County.

This season's record-setting flight produced scattered heavy larval infestations in August and September in the central and western areas of the state with a history of higher western bean cutworm pressure. Fall surveys in field corn found larvae in ear tips at 18% of the sites visited, and in some cases, as many as 10-12 larvae per 25 corn ears sampled for caterpillars.



Map 9. Western Bean Cutworm Moth Counts 2023

Western bean cutworm moth I OSU.edu

Cooperator Networks

Cooperator networks are an efficient, cost-effective approach DATCP's Pest Survey Program has used for more than 30 years to accomplish its pest surveillance and early detection goals. The program enlists volunteers throughout the state to collect and report data on the leading economic pests of concern to Wisconsin crop producers. Insect trapping data supplied by the networks indicate current risk level and help growers prepare for pest threats. Cooperators represent a variety of agricultural backgrounds, including agronomists, farmers, crop consultants, growers, and UW-Extension staff.

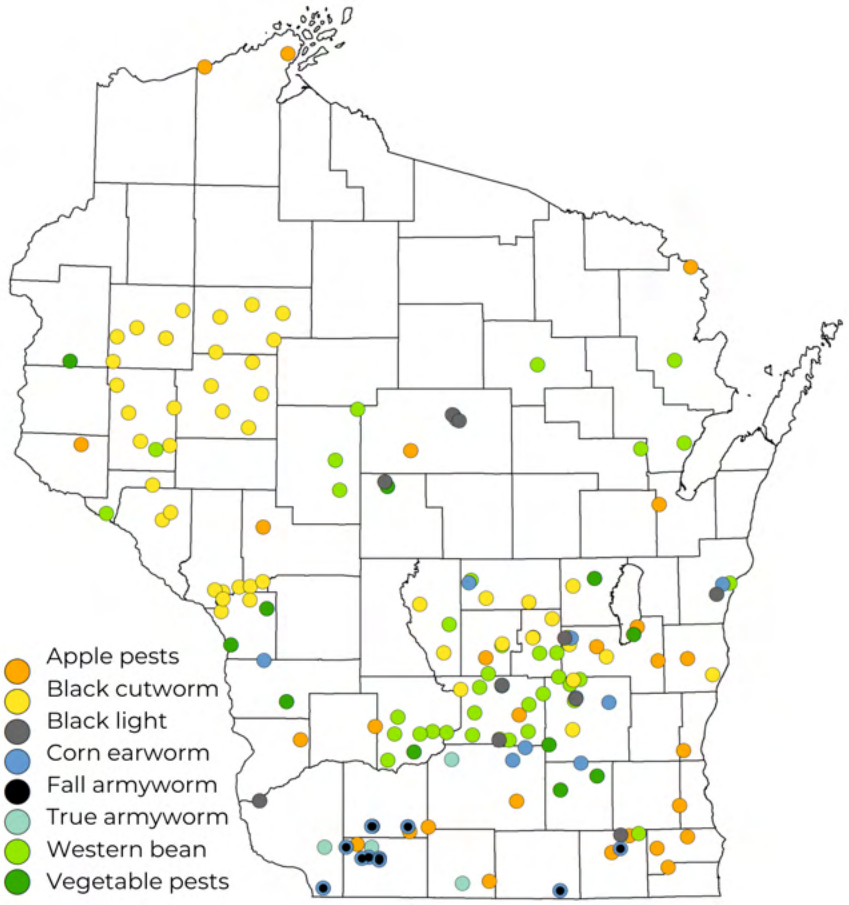
In 2023, the Pest Survey Program maintained eight networks consisting of 70 cooperators:

- 32 cooperators in 25 counties provided precise emergence and flight data on corn earworm, true armyworm, western bean cutworm, and other pests of field crops. Data from the 138 traps included in these networks is especially useful for forecasting outbreaks of priority corn pests.

- 26 apple orchards participated in the apple pest monitoring network, covering 21 counties and setting 182 traps for seven pests.

- 12 vegetable growers joined our early detection effort for the invasive leek moth and swede midge. A total of 48 traps (four per site) were set in 10 counties.

- Our eight cooperator networks included a total of 176 sites spanning across 45 counties, yielding an enormous volume of data from across the state.



Map 10. Insect Monitoring Network Sites 2023

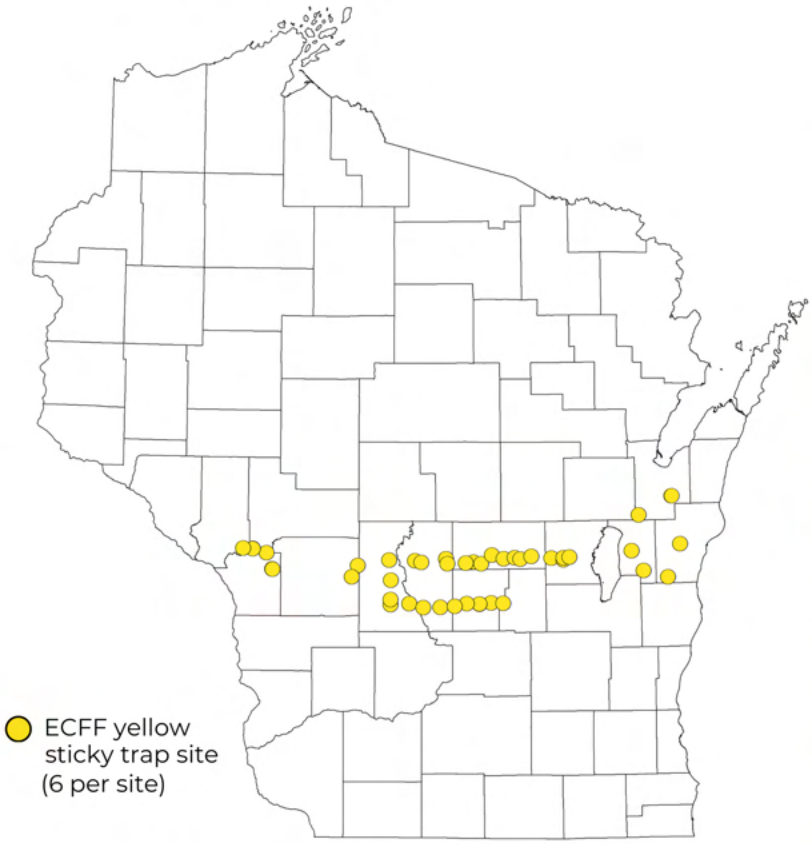
Insect Monitoring Network Trap Numbers 2023

Pest Type	Cooperators	Traps Set	Trap Type
Apple orchard	26	182	Pheromone
Black cutworm	11	50	Pheromone
Black light	9	9	Black light
Corn earworm	11	12	Hartstack
Armyworm	10	25	Pheromone
Vegetable	12	48	Pheromone
Western bean	18	42	Pheromone

Fruit Pest Surveys

European Cherry Fruit Fly

A large-scale early detection survey for this new cherry pest native to Europe and parts of Asia was conducted in Wisconsin this season. First discovered in North America in 2016 in Ontario, Canada, and along the Niagara River in New York in 2017, the European cherry fruit fly (ECFF) is a USDA National Priority Pest that may be introduced to new areas through the transport of infested fresh cherries, soil, or fruit from host plants grown in areas where ECFF is found. Although the New York State Department of Agriculture has enacted a quarantine including Erie, Niagara, and Orleans counties, ECFF uses the widely prevalent non-native invasive honeysuckle (*Lonicera* spp.) as a host, therefore its spread is expected to continue.



Map 11. European cherry fruit fly survey 2023

European cherry fruit fly trap I DATCP

In 2023, DATCP field specialists set a total of 240 yellow sticky traps baited with ammonium acetate at 40 sites across central and eastern Wisconsin. The traps were set in roadside honeysuckle bushes in May and checked biweekly through August for ECFF flies. The survey generated a total of 1,097 trap samples; all were negative for ECFF.

European cherry fruit fly traps I DATCP

Swede midge survey trap I DATCP

Community garden survey I DATCP

Vegetable Pest Surveys

Leek moth and Swede Midge

DATCP established a new vegetable pest detection network this season to survey for emerging invasive vegetable pests. Twelve CSA farms and community gardens volunteered to set pheromone traps and send in samples at the end of the season for screening and identification. The primary targets of the trapping effort were the swede midge and leek moth. The former is a newly introduced species that has been found in Dane and Milwaukee counties in the last five years, while the latter has not yet been documented in Wisconsin. No new detections of swede midge or leek moth resulted from the survey.

Community Garden Survey

Plant pathologists at the DATCP Plant Industry Bureau Lab conducted a survey for tomato brown rugose fruit virus (ToBRFV) and potato spindle tuber viroid (PSTVd) in 2023. Tomato brown rugose fruit virus is a threat to tomato and pepper production, while PSTVd affects potato, tomato, and pepper. The survey included 10 community gardens in Dane County. During regular visits, 96 composite samples of one or two leaves from each tomato, potato, or pepper plant were collected per plot and tested for PSTVd. At two of the plots, no tomato or pepper plants were present, so only 94 samples were tested for ToBRFV. Neither pathogen was detected on any of the samples.

Brown Marmorated Stink Bug

Sheboygan County was the newest addition to the Wisconsin BMSB distribution map in 2023. Forty-two of the state's 72 counties now have confirmed BMSB finds. Reproducing populations of this invasive pest have become well established in southern and eastern Wisconsin in the last decade, and range expansion continues to advance into the western and northern areas of the state.

Plant Pest & Biological Control Permits

Imperata cylindrica 'Red Barron' I Wouter Hagens

The Plant Industry Bureau reviews USDA APHIS Plant Protection and Quarantine (PPQ) 526 permit applications to import or distribute plant pests, biological control organisms, and noxious weeds in Wisconsin. Requests for PPQ 526 permits are approved only if the organism(s) on the application is widely established in the state or an environmental risk assessment indicates little risk of adverse effect from the importation. Conditions on containment and disposal methods may be imposed, facility inspections may be conducted to ensure permit conditions are met, and state and federal PPQ officials must concur to allow importation.

Pest Survey specialists processed a total of 229 PPQ 526 permit applications this year: 125 for insects and arthropods, 94 for plant pathogens, five for earthworms (*Lumbricus terrestris*), three for biological control organisms (insects), and two applications for the federal noxious weed *Imperata cylindrica* var. *koenigii* (Retzius) cultivar 'Red Baron'.

The applications for *Imperata cylindrica* were denied. Although the USDA APHIS prohibits the importation and interstate movement of wild-type *I. cylindrica*, an exception has been made for the ornamental red cultivar ('Red Barron', 'Rubra', or Japanese blood grass) because it is considered sterile. However, research in the last decade has demonstrated that the "sterile" red varieties of *I. cylindrica* can produce seed and revert to a green form with aggressive characteristics. Given this risk, DATCP determined in 2023 that it will deny future permit requests for entry of all cultivars of *I. cylindrica* into Wisconsin.

Plant Pest & Biological Control Permits

Permit request trends in 2023 included a continued high volume of applications for isopods. Also known as pill bugs or woodlice, isopods are used for cleanup in terrariums and are valued by hobbyists for their aesthetics. A similar rise in imports of various ant species for interstate commercial resale to hobbyists was also observed this year. Seventy-five of the permits issued in 2023 were for isopods, 16 were for ants, and 34 were for butterflies, moths, and crickets.

In addition to PPQ 526 permits, bureau staff also review federal PPQ 525-A permits to receive soil and PPQ 588 Controlled Import Permits to import plants or plant products for experimental or developmental purposes. Staff approved 21 PPQ 588 permits submitted as new applications, amendments, or renewals, and nine PPQ 525-A permits this year, for a total of 259 PPQ permits issued.

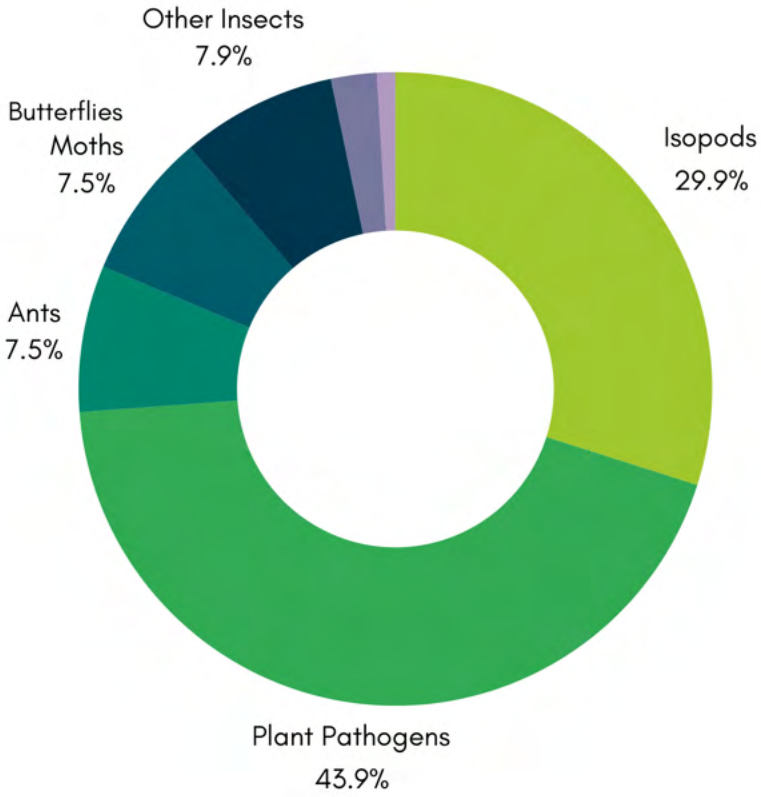
Biotechnology Regulatory Services (BRS) Permits

The USDA-APHIS regulates the import, interstate movement, and environmental release (i.e., outdoor field trials) of certain organisms developed using genetic engineering (including plants, insects, and microbes) that may pose a plant pest risk. Permit applications are carefully reviewed by APHIS regulatory scientists and, in Wisconsin, DATCP staff.

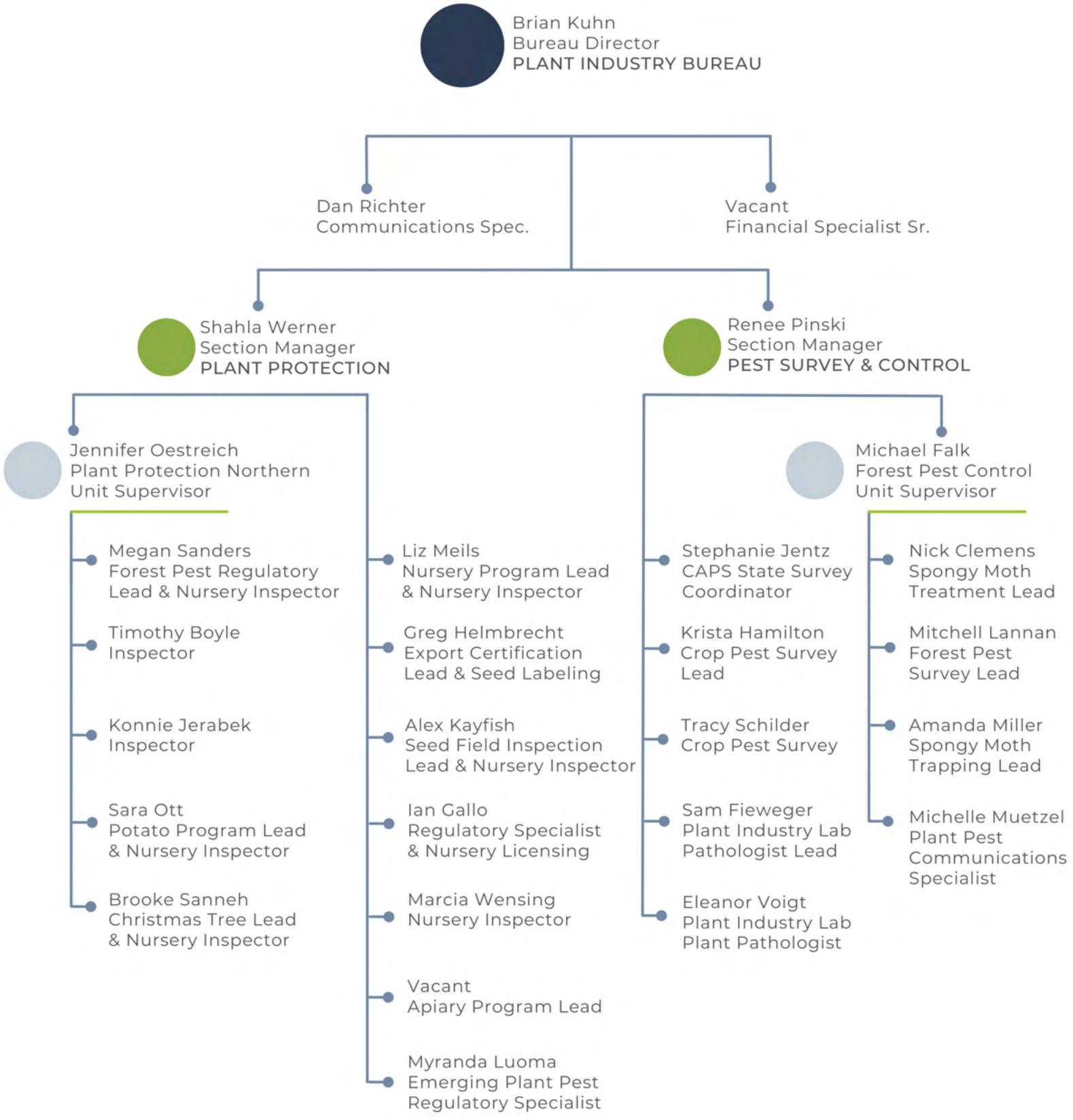
In 2023, the department reviewed and issued concurrence for 110 BRS permits for genetically engineered plants. Herbicide tolerance and insect resistance continue to comprise most of the notification applications. Each year, a subset of Wisconsin permits is inspected by the USDA-APHIS-PPQ staff, often with assistance from a DATCP Plant Industry Bureau representative. This year, no BRS inspections were assigned for Wisconsin.

Plant Pest Permits Issued in 2023

Insects and arthropods accounted for 56% of the 229 PPQ 526 permits issued in 2023, followed by plant pathogenic bacteria, fungi, and viruses at 44%. Insect permit requests included ants, crickets, butterflies, moths, and mainly isopods, which comprised 28% of this year's total. In addition, five permits (2%) were issued for earthworms and two permits (1%) were denied for federal noxious weeds.



Plant Industry Bureau Organization



2023

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BUREAU OF PLANT INDUSTRY

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