DEPARTMENT OF AGRICULTURE

Nursery Certification and Plant Pest Regulatory Program

2023 Annual Report

Prepared December 2023

Contents

Background

The Minnesota Department of Agriculture (MDA) is responsible for the administration of the Nursery Law, Minnesota Statute Chapter 18H and Plant Protection and Export Certification Minnesota Statute Chapter 18G. These laws prevent the introduction and spread of harmful plant pests into the state. To accomplish this, nursery stock produced for sale must be inspected annually and certified free of harmful plant pests. Stock originating outside Minnesota must be officially certified to be free from harmful pests and under all applicable quarantines at origin.

The MDA Nursery Inspection and Certification Program provides a vital service to the nursery industry and protects consumers from purchasing plants that are not viable or contain pests. Annual inspections reduce losses from harmful plant pests by detecting and treating problems before they can cause more serious damage. Certified nursery stock can move freely within the United States, and special certificates are issued for plants being exported. A standard of quality is maintained to assure the industry, as well as consumers, that the product they are purchasing is viable and in a healthy condition.

Anyone selling nursery stock in Minnesota for greater than ten days and has gross sales that exceed $2,000 must have a valid Minnesota Nursery Stock Dealer or Nursery Stock Grower Certificate. They must also sell only certified nursery stock and provide documents to verify certification of stock offered for sale.

Nursery Stock Certificates

There are two types of nursery stock certificates issued by the Minnesota Department of Agriculture (MDA) Nursery Inspection and Certification Program, grower, and dealer. Nursery stock growers include businesses that grow more than half of the nursery stock they sell. Grower fees are based on the number of acres that the business is growing nursery stock on. Nursery stock dealers include businesses that purchase more than half of the nursery stock they sell. Nursery stock dealers can also grow nursery stock. The dealer fees are based on gross sales of nursery stock from the previous year. Nursery stock includes trees, shrubs, vines, perennials, biennials, grafts, cuttings, and buds. In 2025 under legislative approval, a fee change will be taking place for all nursery certificate holders.

Nursery Stock Grower Certificates remained the same between 2022 and 2023, while nursery stock dealer certificates decreased by seven in 2023. However, this change may be the result of incorrect certification type in past years and not necessarily a change in operational practices.

Table 1. Nursery Stock Certificates Issued

Certificate Type	2018	2019	2020	2021	2022	2023
Nursery Stock Grower	248	286	232	236	224	224
Nursery Stock Dealer	1,951	2,158	1,819	1,837	1,852	1845
Total Certificates	**2,199**	**2,444**	**2,051**	**2,073**	**2,076**	**2069**

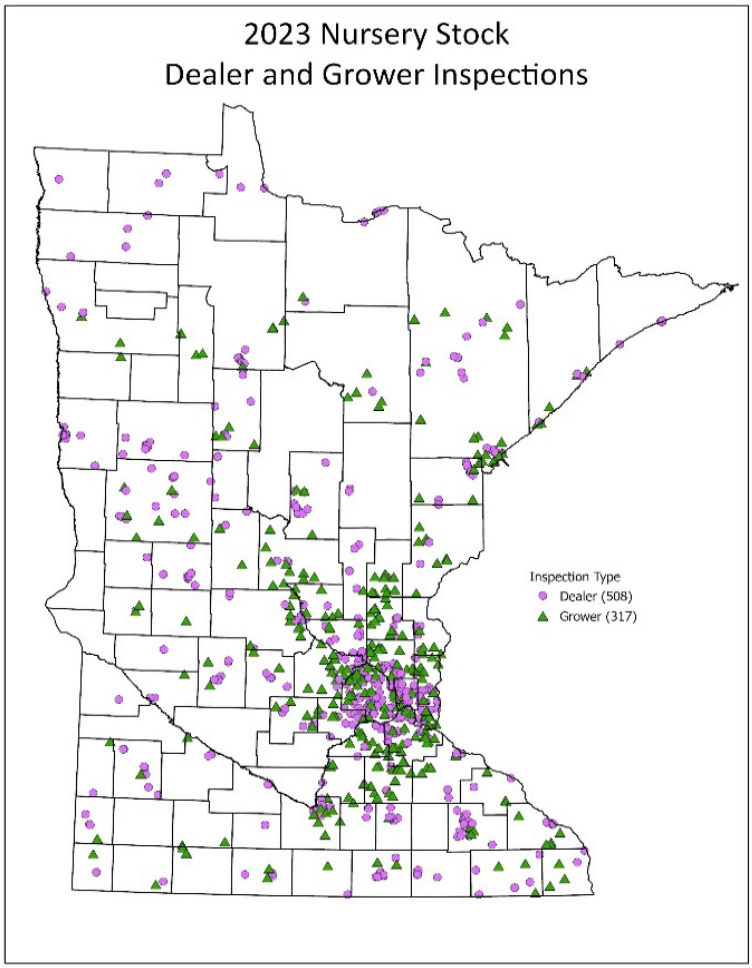
Table 2. Nursery Stock Growing Acres

Certificate Type	2018	2019	2020	2021	2022	2023
Nursery Stock Grower	-	-	3,954	3,804	4,116	4022
Nursery Stock Dealer	-	-	2,204	995	1,319	1050
Total Acres	**5,312**	**5,378**	**6,158**	**4,799**	**5,435**	**5072**

Nursery Stock Inspections

The Nursery Inspection and Certification Program historically had five regional staff. The program had three open vacancies before the 2023 inspection season. The season was delayed until the beginning of May once three new staff were hired. Staff were located in Bemidji, Perham, Rochester, and the Twin Cities. As of August 14, 2023, there became a vacancy in the northern part of the state. This vacancy was filled in January 2024 and staff will be located out of Brainard. Staff completed 821 nursery inspections in 2023. This included 375 mandatory inspections of growers and dealers with growing stock. A mandatory inspection is done on all nursery stock grown for sale. Inspections at dealers with no growing stock are prioritized to focus on out of state sources of stock and sales volume. Those that purchase stock from outside Minnesota and have gross sales of nursery stock above $20,000 were classified as high priority. Inspectors completed 372 high priority dealer inspections. Low priority dealers purchase stock from within Minnesota with annual gross sales below $20,000. Sixty-six of these inspections were completed.

Figure 1. Locations of 2023 nursery stock dealer and grower inspections.



Plant Pest Incidents

The purpose of an inspection visit is to identify plants that are not certified for sale due to a plant insect, disease, noxious weed, or other plant health condition. Each inspection where a plant pest is found is considered a singular incident of the specific pest or pathogen. The use of incidents in reporting 2023 findings is to show the general spread of the pest or pathogen throughout the state, number of plants indicate overall volume and is noted separately in the data below. Plants may be restricted until the appropriate regulatory response is completed allowing plants to be offered for sale. In 2023, inspectors reported 1067 incidents involving 19,819 plants requiring regulatory action. This is an increase from 2022 when 875 incidents were identified involving 10,736 plants.

Insect Pests

The most common insects encountered during the 2023 season were boring insects, scale, spider mites, and adelgids (Table 3). Borer and scale insects being the most significant, as they are detrimental and impactful to the nursery industry. A small population of wood boring insects can feed, tunnel, and kill a large number of trees. Early detection of borers can be difficult to detect since they feed under the bark. Sawdust like frass, sap flow, raised ridges of bark, and exit holes are the obvious signs of borer attack. Infested trees are removed and destroyed. A breakout of boring insects is reported below, the term general was used when specific species wasn't identified.

Scales are sap sucking insects, and in large numbers cause stunting, branch dieback, and in rare occasions plant death. Scale may spread viruses and are often difficult to manage and eradicate, plants are held off sale until treated. Spider mites when found at very high populations can cause plant stress and damage as they puncture plant cells to feed. Spider mite infestations must be treated and controlled before sale.

Table 3. Top Insect Pests

Most Reported Insects	Number of Times Reported	Number of Plants Reported
Borers	33	289
General Scale	13	70
General Spider Mite	11	136
Pine Bark Adelgid	9	163
Eastern Spruce Gall Adelgid	8	25
Eriophyid Mite	6	22
Zimmerman Pine Moth	5	10
Leaf Hopper Burn	3	5
Fall Webworm	2	7
Viburnum Leaf Beetle	2	31

Table 4. Top Boring Insect Pests

Most Reported Borers	Number of Times Reported	Number of Plants Reported
General Borer	22	185
Bronze Birch Borer	7	31
Emerald Ash Borer	1	63
Honeylocust Borer	1	2
Linden Borer	1	1
Two-Lined Chestnut Borer	1	7

Disease Pests

Most significant diseases for 2023 inspections included canker and general virus. Cankers can be caused either by living organisms, including fungi, bacteria, and insects, by weather, or mechanical wounds. Trees found with cankers must be removed and destroyed. In many cases, the specific identity of the canker organism is not determined and are reported as general canker. Cytospora, Nectria, and Golden canker can be found in Table 6. Viral infections can manifest in a variety of symptoms leaf discoloration, wilting, necrosis, deformities, stunted growth, reduced vigor, and poor fruit quality. As a virus cannot be cured, plants found with suspected virus are submitted for laboratory testing. A negative laboratory test result is required prior to sale. In total 7,817 plants were reported as suspected of virus in 2023. Powdery mildew, all fungal leaf spots, peony leaf blotch, general black spot, apple scab, rose black spot were commonly found but due to disease severity and ubiquitous nature were not included below.

Table 5. Top Significant Diseases

Most Reported Diseases	Number of Times Reported	Number of Plants Reported
Canker	189	750
Suspected Virus	53	7817
Pseudomonas	21	164
Spruce Needlecast Complex	20	195
General Rust Fungi	12	456
Phomopsis Blight	11	594
Phytophthora Root Rot	11	113
Dothistroma Needle Blight	10	81
Alternaria Leaf Spot	10	39
White Pine Blister Rust	5	25

Table 6. Top Cankers

Reported Cankers	Number of Times Reported	Number of Plants Reported
General Canker	181	738
Cytospora Canker	5	7
Nectria Canker	2	4
Golden Canker	1	1

Abiotic Causes

Along with insects and disease organisms, inspectors encountered a number of conditions where stock was not handled or cared for properly. Stock is considered non-viable if it is determined that stock will not grow with normal vigor when given reasonable care. These are referred to as abiotic causes as listed in Table 7 below. Non-viable plants were removed from sale.

Table 7. Top abiotic incidents

Most Reported Abiotic	Number of Times Reported	Number of Plants Reported
Non-Viable	227	1130
General Chlorosis	10	15
General Animal Damage	8	28
Herbicide Injury	4	51
Nickel deficiency	4	27
Root Balls not Covered	3	5
Heat Stress	3	37
Girdling wire/string	1	1
Winter Injury	1	16

Spirea Yellow Leafspot Virus (SYLSV)

Spirea yellow leafspot disease is caused by a bacilliform *Badnavirus* named spiraea yellow leafspot virus (SYLSV). In *Spiraea spp.*, the virus can cause chlorotic spotting, stunting, and leaf deformation from June to the beginning of winter (Figure 2). SYLSV has only been reported in the United States and was first observed on 'Anthony Waterer' spirea on the University of Minnesota campus in 1997. In 2002, two co-infecting viruses associated with these symptoms were identified, but SYLSV is currently considered the primary causal agent for this disease. Virus symptoms have been observed on the following spirea cultivars in Minnesota: 'Alpina', 'Anthony Waterer', 'Double Play', 'Japanese White', 'Little Princess', 'Neon Flash', 'Norman', 'Goldflame', 'Goldmound', 'Shibori', 'Snowbound', and 'Superstar'. Other spirea cultivars are at risk, but it is unlikely that any other host species besides *Spiraea* would be susceptible to SYLSV.

Figure 2. *Spirea spp.* exhibiting symptoms of SYLV infection.

Both viruses are vectored by *Aphis spiraecola*, the spirea aphid (A.K.A. apple aphid or green citrus aphid). It is best practice for growers to test their mother plants prior to propagation and to develop an integrated pest management program to control insect populations. Currently the University of Minnesota's Plant Disease Clinic (PDC) offers an affordable PCR test to detect SYLSV and research is ongoing to develop an additional PCR test to detect the lesser-known co-infecting virus, spiraea leafspot spherical virus (SLSSV).

Be advised that eriophyid mite feeding damage can cause similar symptoms to SYLSV. There is also a spirea stunt phytoplasma that can cause viral-like symptoms. This emphasizes the importance in laboratory testing before applying any regulatory actions. In Minnesota, the current regulatory action for all viral diseases is "Quarantine: Remove and destroy pending negative laboratory results."

When the disease was characterized in 2002, it was thought to exist in pocket populations. Between 2018-2020, there was an increase of virus-positive samples that were submitted to the PDC. This led to a hypothesis that years with mild winters generate a higher incidence of SYLSV the following year due to higher survival of the vectoring insect pest. In 2023, the MDA quarantined more than 6,500 virus-symptomatic plants in all five inspector regions.

Violations

The Nursery Inspection and Certification Program issued 306 reports of violation to nursery stock dealer and grower certificate holders in 2023. The highest incidents of violations were Mislabeled Cold-Hardiness Plants with 142 incidents violating Minnesota Statute 18H.14. The statute protects consumers from being misled by plants being labeled with the incorrect minimum cold hardiness.

The enforcement of Minnesota's Noxious Weed Law Minnesota Statutes, sections 18.75 to 18.91 resulted in the second highest incidents of violations. Specially regulated noxious weeds in Minnesota must be accompanied by a label detailing how to distance plantings from native areas and be controlled by mowing or other means to avoid further disbursement. This lack of labeling accounted for 73 incidents in which 755 plants were not properly labeled.

Sixty-three violations were issued for dormant-packaged plants that had not been stored properly and were non-viable. Packaged plants are sold in early spring and must be kept in a dormant state to maintain viability. Once they break dormancy, they must be planted immediately, or they will likely not survive. Enforcement of Minnesota statutes 18H.10a and 18H.10b and statute 18H.12b resulted in a total of 2,672 plants with a retail value of $31,000 taken off sale in 2023.

The sale of restricted noxious weeds such as 'Rose glow' and 'Golden Carousel' barberry (*Berberis thunbergia*), saltcedar (*Tamarix ramosissima*), Siberian pea shrub (*Caragana arborescens*), and winged burning bush (*Euonymus alatus*) were documented at 23 locations. This resulted in a stop sale of 959 plants.

Figure 3. Winged burning bush held off sale because it is a restricted noxious weed.

Minnesota regulations require all nonhardy nursery stock to be labeled for proper hardiness or be labeled "nonhardy". Three violations were issued, and 41 plants were corrected based on the Cold Hardiness List on the MDA website.

Lastly two violations were for root ball exposure on balled and burlapped material, impacting 575 plants. Minnesota regulations require balled and burlapped nursery stock to be adequately covered to protect the root ball and maintain necessary moisture. All reports of violation were forwarded to the MDA's Plant Protection Division Compliance Officer for further action and possible regulatory penalties.

Table 8. Reports of Violation

Violation Type	Sites	Incidents	Number of Plants Affected
Mislabeled Cold-Hardiness Plants	77	142	1,290
Specially Regulated Noxious Weed: Amur, Norway, and Tatarian Maple	42	73	755
Dormant Packaged Plants	31	63	2,672
Restricted Noxious Weed: Winged burning bush (*Euonymus alatus*)	15	15	921
Restricted Noxious Weed: Japanese barberry 'Rose glow' (*Berberis thunbergia*)	5	5	28
Missing nonhardy labeling	3	3	41
Balled and burlapped root ball exposed	2	2	575
Restricted Noxious Weed: Saltcedar (*Tamarix ramosissima*)	1	1	6
Restricted Noxious Weed: Siberian peashrub (*Caragana* spp.)	1	1	3
Restricted Noxious Weed: Japanese barberry 'Golden Carousel' (*Berberis thunbergia*)	1	1	1
Totals	**178**	**306**	**6,292**

Cold Hardiness

To assure that consumers are not being misled by plant labels regarding accurate cold hardiness claims, Minnesota regulations require all nursery stock to be labeled with correct hardiness zones as defined by the United States Department of Agriculture and all labels must be consistent with the Cold Hardiness List on the MDA website. This list is used to identify false or misleading United States Department of Agriculture (USDA) plant hardiness zone labeling of plants offered for sale, which is a violation of Minnesota Statute 18H.14. One hundred and forty-two violations at 77 sites were issued due to mislabeling of cold hardiness in 2023. This is an increase from 2022 where only six reports of violation were issued. Use of technology by inspectors allowed look up improvements on the MDA Cold Hardiness List website. This new process resulted in quick validation and corrections across the state, primarily with repeat corporate violations.

The Cold Hardiness List is reviewed annually by the MDA and stakeholders for changes in hardiness zones, addition of new plant cultivars, and other updates as necessary. The MDA will be reviewing and solicitating new plants to be listed in January 2025, through September 1, 2024. The MDA does not restrict plants from being sold that are not listed on the MDA Cold Hardiness List, however plants that are not labeled for cold hardiness and are not cold hardy in the area in which they are being sold must be labeled “nonhardy.” It is recommended that all plants be tagged with an accurate plant hardiness zone. The list will be published online each fall for the following growing season. The current Cold Hardiness List can be found on the MDA website.

For the 2024 season an editorial change to Chestnut Crabapple to Fruiting Apple with a hardiness of Zone 3 was removed from Malus Flowering Crabapple. In fall of 2023 the USDA made changes to the USDA Plant Hardiness Zone Map. This does not have any impact on the MDA’s Cold Hardiness list designations. Information on the USDA Plant Hardiness Zone Map can be found on the University of Minnesota Extension website.

Figure 4. Cold hardiness zones of Minnesota.

Dormant Packaged Plants

Dormant packaged plants are plants that are sold in a dormant state, are bare root, and packaged in a plastic sleeve or other packaging containing peat, sawdust, or other moisture-retaining packing materials. Regulated packaged plants can include perennials such as hydrangeas, hostas, daylilies, astilbe, peonies, grapes, raspberries, and strawberries. Fruit trees, nut trees, and lilac shrubs may also be packaged and sold as a packaged plants and will be regulated as such. However, packaged garden vegetables, like asparagus and rhubarb roots are not regulated.

Packaged dormant plants are typically sold in the spring to box stores and garden centers. They originate in coolers to retain the dormant status, so they don't exhibit growth, are delivered to retailers to be sold immediately and put into the ground. However, in Minnesota, many stores receive these dormant packaged plants at the end of February through March when the ground is still frozen or covered with snow. To stay in compliance with the law, packaged plants must be kept in cool but above freezing temperatures to prevent the loss of dormancy and to maintain plant health. Dormancy is defined in statue as nursery stock without etiolated growth. Etiolated growth is the bleached and unnatural growth resulting from the exclusion of sunlight (MN Statue 18H.02 subd 12a and 12b.) Properly stored packaged plants can be maintained in a dormant state for many weeks. However, when displayed in typical retail store temperatures and lighting, packaged plants quickly break dormancy and start to grow. Once plants begin to grow, the retailer has three options: Pot the plants and care for them as potted stock, return them to the shipper, or destroy them.

MN Statue 18H.10 regulates the storage of nursery stock to maintain viability. (a) All nursery stock must be kept and displayed under conditions of temperature, light, and moisture sufficient to maintain the viability and vigor of the nursery stock. (b) Packaged dormant nursery stock must be stored under conditions that retard growth, prevent etiolated growth, and protect its viability.

MN Statue 18H.12 protects the consumer from being deceived about the viability of a plant. 18H.12 (b) No person may knowingly offer to distribute, advertise, or display nursery stock that may result in the capacity and tendency or effect of deceiving any purchaser or prospective purchaser as to the quantity, size, grade, kind, species name, age, variety, maturity, condition, vigor, hardiness, number of times transplanted, growth ability, growth characteristics, rate of growth, time required before flowering or fruiting, price, origin, place where grown, or any other material respect.

Figure 5. Packaged plants with etiolated growth.

Minnesota inspectors typically begin early season inspections for dormant packaged plants around April 1st. When dormant packaged plants are found to have broken dormancy and have etiolated growth, are dying, dried out, or damaged they must be removed from sale. Sixty-six violations were issued at sites in 2023 with 2,672 plants being taken off sale. Retail value of plants removed from sale in 2023 was more than $31,000. This is less than 45% of the $72,000 non-viable-packaged plants removed from sale in 2022. This decrease was largely due to inspector vacancies and the subsequent delayed start date of the spring inspection season. Three of five inspector positions were vacant in April of 2023 and spring inspections started in May of 2023, in contrast to April of 2022.

Regulated Noxious Weeds

The MDA also inspects for invasive plants being offered for sale. Plants found on the Minnesota Noxious Weed List must be removed from sale and can result in fines or penalties. There are three listing of noxious weeds in Minnesota: prohibited noxious weeds, restricted noxious weeds, and specially regulated noxious weeds. Prohibited and restricted noxious weeds cannot be sold or propagated within the state of Minnesota. Specially regulated plants are noxious weeds that have specific management criteria. They may be sold but have restrictions within the nursery trade.

Prohibited Noxious Weeds

No prohibited noxious weeds were found during routine nursery inspections in 2023.

Restricted Noxious Weeds

It is in violation of the Minnesota Noxious Weed Law to offer for sale or propagate restricted listed plants. Currently there are 26 varieties of barberry that are restricted noxious weeds and cannot be offered for sale in Minnesota. During routine inspections in 2023, barberry cultivars ‘Rose Glow’ and 'Golden Carousel' were offered for sale at six Minnesota sites. A total of 29 *Berberis* plants were removed from sale.

Additionally, barberry is also the alternate host of black stem rust of wheat and other small grains. As such, only barberry plants that have been tested at the USDA Cereal Disease Lab, are found resistant, and are propagated asexually can be offered for sale in protected cereal producing states, including Minnesota. The USDA publishes a list of approved, named barberry cultivars. Inspectors cross reference both the USDA approved black stem resistant list and Minnesota Restricted Noxious Weed list to ensure barberry cultivar compliance.

Saltcedar (*Tamarix ramosissima*) was added to the restricted list in 2023. One site was found offering for sale six *Tamarix* plants. The plants were ordered off sale.

Figure 6. ‘Rose glow’ barberry held off sale because it is a restricted noxious weed.

Siberian Pea shrub (*Caragana arborescens*) was added to the restricted list in 2020. In 2023 one site was found offering for sale three *Caragana* plants and the plants were ordered off sale.

Burning bush (*Euonymus alatus*) was a commonly used landscape plant but was found to have naturalized in areas of Minnesota forests. A three-year phase out for this species ended in 2023 placing it onto the Restricted Noxious Weeds List. Winged burning bush made up 95% of all the restricted noxious weed violations. A total of 921 *Euonymus* plants at 15 locations received stop sale orders, requiring the plants to be removed from sale.

Specially Regulated Noxious Weeds

Amur maple (*Acer ginnala*), Norway maple (*Acer platanoides*), and Tatarian maple (*Acer tataricum*) are specially regulated plants that have demonstrated economic value, but also have the potential to cause harm in non-controlled environments. Specific rules or management plans, developed by the MDA under Minnesota Statute 18.771(e), requires that these plants and their cultivars be accompanied by a label with instructions to plant only in areas where seedlings will be controlled by mowing or other means and at least 100 yards from natural areas. Each plant must have the specially regulated language affixed as an instruction tag for the consumer. A Report of Violation is issued if this information is absent, plants are removed from sale until the labeling is corrected, and fines or penalties may apply. In 2023, 42 sites with 755 plants were found without proper labeling.

Figure 7. Norway maple trees without proper labeling.

Wildflower Permits

To protect the state flower and other endangered wildflowers, Minnesota Statute 18H.18 Conservation of Certain Wildflowers prohibits the sale of certain wildflowers without written permission from the property owner and a permit from the MDA. Protected plants must be placed into cultivation for a minimum period of one growing season and cannot be sold directly after being collected. This year three permits were issued.

Figure 8. Lady slipper wildflowers.

Nursery Exports

Nursery stock and plants being exported must meet certain phytosanitary conditions for entry into foreign countries, including an inspection and the witnessing of official treatments. The MDA issued 171 Federal Phytosanitary Certificates for nursery stock.

2023 Phytosanitary Certificates for Exports

- 681,674 plants
- 127,651 bulbs/roots/tubers (mainly re-exports from Amsterdam going to Canada)
- 333 budwood stems

Japanese Beetle Certification

Japanese beetles are highly destructive plant pests that attack foliage, flowers, and fruits of more than 300 ornamental and agricultural plants. The spread of Japanese beetle in the United States led to the creation of the U.S. Domestic Japanese Beetle Harmonization Plan in 1998 to slow the spread of Japanese beetles across the United States.

Minnesota is a Category 3 state. This means that Japanese beetle certification is required to ship regulated articles to all Category 1 and 2 states. Regulated articles include any plants with soil or growing media because Japanese beetle grubs live in the soil. Bareroot stock free from soil is exempt.

Japanese beetle certification can be obtained via different methods, depending on the category of the destination state. Approved methods include a trapping survey, soil sampling, and treatment of plants prior to shipment. More details regarding Japanese beetle certification can be found on the National Plant Board website.

The MDA issues Japanese beetle certificates to accompany all shipments to Category 1 and 2 states. The MDA's Export Certification Program conducts most of the Japanese beetle trapping and soil sampling activities which are used to verify site eligibility.

2023 Japanese Beetle Survey

Trapping was conducted at six sites to determine if adult beetles were present. No adult beetles were recovered. Once positive, a site cannot use survey via trapping again and must implement alternative options for Japanese beetle certification.

Soil sampling was conducted at six sites to detect Japanese beetle grubs in the soil. This method is used at many sites that have had positive trapping results. The number of samples needed is based upon the number of acres to be certified. For example, 50 spade samples are required for 25 to 50 acres. Spade samples are examined for beetle grubs. There were no grubs found in soil samples in 2023.

Figure 9. Japanese beetles in a trap.

Spongy Moth

Spongy moth (Lymantria dispar) is a federally regulated plant pest in the eastern United States and Canadian provinces. Populations in Minnesota exist in the far northeastern region of the state. Cook and Lake counties are quarantined for spongy moth, where it is considered established, but populations have not yet reached outbreak-levels. Spongy moth is not established in the rest of the state. Annually the MDA's Spongy Moth Survey Program places approximately 20,000 early detection traps to monitor for isolated populations. Due to the insect's ability to hitchhike on outdoor materials, the MDA conducts targeted monitoring at nursery locations across Minnesota that bring in nursery stock from sources in areas where spongy moth is established. In 2023, the MDA placed 399 survey traps at 119 nurseries across the state. Nearly 45% of these locations had positive male moth detections. Inspections were conducted where needed but no females or additional life stages were identified to indicate established populations. Many of these nursery sites were in areas surrounded by low level male moth finds.

The MDA establishes compliance agreements with entities that wish to move regulated articles out of spongy moth quarantine areas. Most regulatory activities occur in Cook and Lake counties, which were quarantined in 2014. Cook and Lake counties are also under a parallel federal quarantine for spongy moth. Since there are currently no nursery growers, only nursery dealers located in these counties, much of the MDA's focus is with the timber and holiday greenery industries.

The MDA regularly reviews and audits spongy moth quarantine compliance throughout Minnesota by assuring nursery stock received from spongy moth quarantine areas arrive with proper certification to assure it is free from spongy moth prior to entering non-quarantined areas of Minnesota. In 2023, there were no violations resulting from non-certified stock arriving without proper certification. However, in rare circumstances, certified product can arrive infested and thus careful inspections should occur when nursery operations receive regulated stock prior to unloading.

Spongy moth populations are on the rise in Minnesota and neighboring states. In 2023 Minnesota's spongy moth detections reached a historical all time high with 112,932 male moths being detected statewide. This breaks the 2022 record when 101,763 moths were detected. The following counties had the highest percentages of statewide catches: Lake County having 40.54%, St. Louis 33.46%, Carlton 10.42%, Cook 7.02%, Pine 3.61%. Both Wisconsin and Michigan also have seen significant spongy moth population booms in recent years. It is important for the nursery trade to stay vigilant and assure this pest does not get a foothold in Minnesota. For the complete MDA Spongy Moth Trapping Survey Results visit: www.mda.state.mn.us/spongymothsurveyresults2023

Figure 10. Spongy moth female moth and egg mass.

Nursery and Christmas Tree Farm Survey

The introduction of pests through the nursery industry and Christmas tree farms is a threat to urban forests, natural ecosystems, and agricultural crops in the United States. In recent years, multiple interceptions of invasive species to Minnesota and/or neighboring states have occurred through these industries. These introductions have led to trace forward events, delimit surveys, regulatory actions such as stop sales, and collect and destroy events. In 2019, over 1,500 Christmas trees were removed from sale due to detection of elongate hemlock scale. In 2020, an estimated 10,000 geraniums were destroyed due to detection of *Ralstonia solanacearum* race 3 biovar 2. Trace forward events for *Phytophthora ramorum* occurred in both 2019 and 2021. This data demonstrates the need for a comprehensive survey to monitor for invasive insects and pathogens in the nursery industry and Christmas tree farms in Minnesota.

This is the second year of survey funded by the Plant Protection Act 7721. There were 15 insect pests and 12 pathogens of concern included in the surveys. Targets were chosen based on their potential to cause significant damage to crops and native plant communities in Minnesota. Survey staff conducted surveys at 28 nurseries and 19 Christmas tree farms in 19 counties. Survey locations were visited multiple times throughout the growing season to monitor for pest targets.

Red star rust, caused by the fungus *Gymnosporangium yamadae*, is native to Japan, China, and Korea. This disease was first identified in the US in 2009 in several northeastern states and was reported in Wisconsin in 2021 and Minnesota in 2022. In 2023, the MDA identified red star rust in Carver and Washington counties. Infected apple trees were present in commercial apple orchards and nurseries.

Figure 11. Red star rust.

In 2023, the MDA collected soil and water from all nursery survey sites to look for invasive species of *Phytophthora*. Samples were collected in the spring and fall from nurseries in 13 counties. Spring samples were from 23 locations and fall samples were from 25 locations. Soil was collected from 15 Christmas tree farms in 14 counties in the spring and 14 Christmas tree farms in 11 counties in the fall. The USDA priority invasive Phytophthoras (*P. ramorum* and *P. kernoviae*) were not found at any site in Minnesota. Three species of Phytophthora were identified from soil taken from nursery sites in the fall of 2023; *P. cactorum, P. gonapodyides*, and *P. tropicalis*. *Phytophthora rosacearum* was identified from soil taken at a Christmas tree farm. These species are common in flooded soils and in ponds or waterways. They all are capable of infecting multiple species of trees and shrubs but cause varying levels of damage.

A more detailed report about this survey can be found on the MDA's Pest Survey webpage.

Holiday Greenery

Holiday greenery and Christmas tree inspections are conducted annually by the MDA throughout the state of Minnesota under the authority of Minnesota statute 18G.03. The purpose of these inspections is to prevent the introduction and spread of plant pests within the state and aid in suppression and control. Holiday greenery inspections take place from the week before Thanksgiving to the week before Christmas. However, at the end of October to prepare for the season, inspectors will begin to call and survey large wholesale and retail locations to determine when out of state stock will be delivered. Holiday greenery items that are inspected are but not limited to: cut Christmas trees, spruce tips and other cuttings, porch pots, wreaths, tabletop décor, swags, garland, birch poles and other woody stems and branches.

Audits of shipping documents are conducted at the beginning of each inspection to determine federal quarantine compliance. If stock was received from a federally quarantined area it is required under federal/state requirements that the paperwork must be transported with the stock and the receiving facility have the certification documents on site. Emphasis is placed on federally regulated or federally quarantined plant pests such as boxwood blight and spongy moth or unestablished non-native plant pests considered a potential pest risk, such as elongate hemlock scale and spotted lantern fly.

Elongate Hemlock Scale (EHS)

Elongate hemlock scale (*Fiorina externa*) is believed to have been introduced from Japan and is currently established in the eastern United States. It is reported to develop and reproduce on 43 species of conifers. Primary hosts include hemlock, fir, and spruce. Currently, Minnesota does not have any documented established populations of elongate hemlock scale; however, cut holiday greenery and Christmas trees from infested regions of the U.S. pose a risk for transporting this pest to Minnesota. Holiday greenery inspections over the past five years have identified multiple locations that receive shipments of Christmas trees and wreaths infested with elongate hemlock scale. Infested trees may be resold if they are properly reconditioned by removing infested branches, or the trees may be returned to sender or destroyed.

After finding over a thousand cut Christmas trees infested with elongate hemlock scale in 2019, the MDA began an intensive outreach campaign to retailers reminding them that elongate hemlock scale and other invasive pests can be transported on holiday greens and Christmas trees. Over the past five years, retailers have been targeted with information as they prepare to order for the holiday seasons. The MDA also reached out to partner agencies and stakeholders to communicate a clear, consistent message regarding early detection and proper disposal options.

Figure 12. Cut Christmas trees to be inspected.

The MDA created a holiday greenery best management practices webpage as a one stop shop for early detection and disposal guidance. Typically, holiday greenery buyers from chain stores are contacted by the MDA before stock begins to move to provide plant pest quarantine documents for stock they plan to ship. Inspectors also hand out an outreach packet to the survey sites that they visit which include information on elongate hemlock scale, spongy moth, and other pests of concern along with the appropriate way for consumers to dispose of their holiday greeneries.

In 2023, MDA had 4 staff conducting holiday greenery inspections. Between the months of October and December a total of 242 surveys were conducted. Approximately 42,000 Christmas trees and countless wreaths, swags, porch pots, and other cut greens were inspected. Within the 242 surveys, 104 were large box stores i.e., Home Depot, Walmart, Menards, etc., 62 surveys were certified nursery sites, these made up the bulk of our inspection visits. Other sites visited were grocery stores, temporary Christmas tree sales lots, hardware, and craft stores. Elongate hemlock scale was found at 25 locations and 1774 pieces of holiday greenery were taken off sale. Infested products included 1618 cut Christmas trees, 86 articles of cut greenery, and 70 tabletops.

Survey results show that the majority of product was purchased from Minnesota suppliers. The highest percentage of holiday greenery from out of state sources was from Wisconsin followed by Michigan, North Carolina, Canada, Oregon, and Illinois respectively.

Growers, distributors, and retailers are more aware of the problems holiday greenery pests present. The 2023 inspection season emphasizes the importance of the MDA holiday greenery inspections in protecting Minnesota from the introduction of potentially harmful insect pests.

Figure 13. Cut Christmas trees held off sale.

Table 8. 2023 Holiday Greenery Inspections

Holiday Greenery Inspection Overview	2022	2023
Total surveys/inspections conducted	159	242
Box store inspections	78	104
Certified nursery site inspections	44	62
Total Christmas tree count	22,000	42,000

Dynaspidiotus Abietis

Dynaspidiotus abietis (Schrank) (Diasididae) was a new pest discovered during 2023 MDA holiday greenery inspections. *Dynaspidiotus abietis* is a scale insect native to Eurasia, it causes injury to conifers as it feeds on conifer needles and twigs, causing premature needle drop, and branch desiccation. This insect had not been documented in Minnesota, and had only been documented in a few U.S. states in the early 1900's. This was the first time that *D. abietis* has been documented on Fraser Fir. It was found in 93 Fraser fir, across six locations in Minnesota. Samples were sent to the USDA Systematic Entomology Lab and the MDA received a positive identification of the scale as *D. abietis* (Schrank) (Diasididae). All infested trees were under an MDA Order to Stop Sale/Transport and were ordered to be destroyed via incineration or landfill. The MDA continued to work with these businesses to remedy the situation. Between Elongate Hemlock scale and *D. abietis*, 1867 items were taken off sale in Minnesota.

Figure 14. *Dynaspidiotus abietis* scale.

Table 9. Holiday Greenery Inspection Results

Amount of Holiday Greenery Infested Articles and Sites Found	2022	2023
Elongate Hemlock Scale (EHS) - Christmas trees	317	1618
Elongate Hemlock Scale (EHS) - wreaths, porch pots, tabletop pots, and tree boughs	364	156
Elongate Hemlock Scale Stop Sale - total articles	681	1774
Elongate Hemlock Scale incidence (sites found)	13	25
Dynaspidiotus abietis - Christmas trees	0	93
Dynaspidiotus abietis incidence (sites found)	0	6
Total number of Holiday Greenery articles taken off sale	681	1867

Firewood Heat Treatment Certification

The MDA offers a fee-based Firewood Certification Program for businesses or individuals interested in selling pest-free firewood that meets the USDA heat treatment standards for wood boring pests. This heat treatment certification kills a wide variety of plant pests that are commonly transported in firewood, including emerald ash borer which as of December 2023 is regulated in 46 out of the 85 counties across Minnesota. Heat treatment certification allows hardwood firewood to move freely between emerald ash borer regulated and unregulated quarantine counties. There were 14 MDA certified companies within Minnesota with 17 kilns. A list of current Certified Firewood Producers is available on the MDA website.

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