



MINNESOTA DEPARTMENT
OF AGRICULTURE

Invasive Species Legislative Report

Calendar Year 2008

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	3
INTRODUCTION	3
EXPENDITURES	4
PROGRAM SUMMARIES	5
Plant Health Emergency Response	5
Emerald ash borer: a threat to ash trees	6
Potato cyst nematodes: a threat to potatoes	8
Asian soybean rust: a threat to soybeans	10
Noxious weeds / Invasive plants.....	11
Gypsy moth: a threat to many species of trees	11
Risk of firewood movement.....	13
Plant pest survey: a survey for crop pests.....	14
Exotic wood-boring insects: a threat to many species of trees, particularly pines	15
Karnal bunt: a threat to wheat.....	18
Light brown apple moth: a threat to many species of crops and trees.....	19
Swede midge: threat to canola, cabbage, broccoli and cauliflower.....	20
Commodity and commodity-like surveys and regulation.....	21
Nursery stock	21
Potato	21
Fruits and vegetables.....	21
Seed.....	21
Export certification	22
Integrated pest management (IPM).....	22
Fruit and vegetable IPM.....	22
Weed IPM.....	22
Insect Biological Control	23
Quarantine Facility.....	23
Laboratory.....	23
Permit applications and inspections.....	23

EXECUTIVE SUMMARY

Minnesota Statute Section 18G.12, subd.5 [2008] requires reporting on harmful terrestrial invasive species to the chairs of legislative committees with jurisdiction over environmental and agricultural resource issues. This report fulfills this statutory requirement by summarizing the Minnesota Department of Agriculture (MDA) invasive species program activities during calendar year 2008. Specifically, the report provides:

1. An overview of program accomplishments;
2. Information on expenditures (FY 2008);
3. Analyses of the effectiveness of management;
4. Information related to participation by other state and local units of government;
5. An assessment of future management needs; and
6. Proposed goals for 2009.

INTRODUCTION

Invasive species are non-native organisms (e.g., insects, plants, and pathogens) that cause or may cause economic or environmental harm. Organisms that evolved in one part of the world may wreak havoc in other parts of the world where natural population controls are absent. Invasive species are a major issue in world trade, as countries become more vigilant in safeguarding their borders against new pests hitching rides on imported goods. All nations agree that invasive species have the potential to be economic and environmental catastrophes. In the United States, total costs attributed to invasive pests amount to more than \$120 billion per year (Pimental et al. 2005) Of this, the costs associated with agricultural (crop and pasture) and forest pests exceed \$68 billion and \$4 billion per year, respectively. Invasive species are considered the fastest-growing threat to biodiversity. According to studies by Wilcove et al. (1998) biological invasions are second only to habitat loss in human-related “causes of extinction.”

The MDA administers a number of plant protection statutes that protect Minnesota’s agriculture and environment from invasive plant pests. These statutes include Minnesota Statutes 17.17 Sustainable Agriculture, 18.75 Noxious Weed Law, 18G Plant Protection and Export Certification, 18H Nursery Law, 18J Inspection and Enforcement, and 21.80 Seed Law. Goals of the MDA invasive species programs include:

1. Protection of plants in agricultural and natural areas and their products by exclusion of new invasive pests;
2. Protection of plants in agricultural and natural areas and their products from established invasive pests by utilizing integrated pest management;
3. Assurance that fruit and vegetable produce imported to Minnesota are free of invasive pests;
4. Assurance that nursery stock is free of invasive pests;
5. Assurance that crop seed and other seed sources are not contaminated with invasive or noxious weed seed; and
6. Facilitation of export through certification of pest free plant products.

The threat of new pests with catastrophic potential (e.g., gypsy moth, emerald ash borer, potato cyst nematodes, and soybean rust) makes these MDA programs essential to the well-being of the state. To attain these goals, the MDA’s efforts for invasive species management focus on three strategies:

1. Prevention: new invasive species are prevented from entering Minnesota;
2. Early detection and rapid response: invasive species entering Minnesota are detected early, and further harm mitigated through rapid and appropriate response ; and
3. Control and management: established, widespread invasive species are suppressed as needed to mitigate harm.

The MDA collaborates regularly with other private and public entities to achieve the greatest success possible in the protection of Minnesota’s agricultural, forestry and horticultural resources. The agencies and groups approach this enormous problem from various angles with a great deal of collaboration and cooperation. One collaborative approach involves the Minnesota Invasive Species Advisory Council. This council includes representatives from government, non-profit organizations and private organizations (see Table 1). At council meetings, members give reports on their specific efforts to combat invasive species. This advisory council encourages collaboration and cooperation in invasive species management by minimizing overlap of efforts and maximizing the potential for successful results.

Table 1: Minnesota Invasive Species Advisory Council membership

Great River Greening	Minnesota Native Plant Society
Leech Lake Band of Ojibwe	Minnesota Nursery and Landscape Association
Minneapolis Parks and Recreation Board	Minnesota Shade Tree Advisory Committee
Minnesota Association of County Agricultural Inspectors	National Park Service
Minnesota Board of Water and Soil Resources	Soil and Water Conservation Districts
Minnesota Crop Improvement Association	Superior National Forest
Minnesota Department of Agriculture	The Nature Conservancy
Minnesota Department of Natural Resources	University of Minnesota
Minnesota Department of Transportation	USDA Animal & Plant Health Inspection Service, Plant Protection and Quarantine
Minnesota Farm Bureau	USDA Forest Service
Minnesota Forestry Association	USDA Natural Resource Conservation Service
Minnesota Golf Course Superintendents Association	U.S. Fish & Wildlife Service

EXPENDITURES

Both general fund and federal dollars are included in Tables 2 and 3. The majority of the general fund expenditures are for survey efforts across the state. Administration included employee development, leave time (including breaks), personnel issues, and overhead such as rent, office supplies, etc. Education included printed material, public meetings, informational meetings, and training for county and township agricultural inspectors. Management included planning and executing the control work done for gypsy moth on the North Shore of Minnesota. Inspection included planning, firewood inspections, federal permit follow-up inspections and response to reports from the public. Survey included planning, field time, equipment, data analysis for the following surveys: gypsy moth, potato cyst nematodes, emerald ash borer, Swede midge, light brown apple moth, Sirex wood wasp, and general surveys for exotic wood borers and crop pests. Research involved MDA laboratory development of method protocols and pilot analysis of pathogens of concern, work with the University

of Minnesota to develop research needs and begin to design research projects, and some work on pest risk analysis.

Table 2: MDA invasive species expenditures, FY2008.

Activity	Dollars spent FY2008	Percent of total
Administration	\$244,497.90	12%
Education	\$60,250.54	3%
Management	\$22,023.00	1%
Inspection & regulatory response	\$44,837.39	2%
Survey	\$1,677,516.54	80%
Research	\$58,838.58	3%
Total	\$1,235,125.13	100%

Table 3 below compares state funds to federal funding (Table 3). The MDA leverages state funds to maximize opportunities for federal matching funds.

Table 3: Invasive species general fund dollars and federal dollars by funding string, FY2008

Activity	General fund	Federal fund	Total
Invasive Species, General Fund	\$547,920.65		\$547,920.65
Gypsy Moth, General Fund	\$298,735.60		\$298,735.60
Apiary Survey	\$5,731.16		\$5,731.16
Plant Pest Survey	\$234,240.34		\$234,240.34
Survey Coordinator, CAPS Funds		\$36,876.55	\$36,876.55
Exotic Bark Borer, CAPS Funds		\$18,685.05	\$18,685.05
Sirex Woodwasp, CAPS Funds		\$1,423.10	\$1,423.10
Emerald Ash Borer Survey, Forest Service Funds	\$16,254.37	\$34,491.29	\$50,745.66
Emerald Ash Borer Survey, APHIS Funds		\$3,779.12	\$3,779.12
Potato Cyst Nematode 2006 Fields		\$103,524.40	\$103,524.40
Golden Nematode Trace Forward		\$12,846.10	\$12,846.10
Gypsy Moth, Slow the Spread Funds	\$228,626.90	\$443,109.24	\$671,736.14
Gypsy Moth Survey, USDA Forest Service Funds	\$3,231.00	\$6,000.00	\$9,231.00
Gypsy Moth Survey, APHIS Funds	\$41,463.29	\$52,919.60	\$94,382.89
Gypsy Moth Regulatory, STS Funds	\$7,502.02	\$10,604.16	\$18,106.18

PROGRAM SUMMARIES

Plant Health Emergency Response

The MDA's Plant Health Emergency Response Plan provides a framework to exclude, mitigate or minimize the impact of unwanted invasive plant pest species that may affect Minnesota's agricultural, forest, or native plant species. This plan assigns specific roles and responsibilities for a response according to the nature of the incident. The plan stresses state and federal interagency cooperation as an essential component of rapid response. Plant Protection staff train on the use of the response plan and on operating under the National Incident Management System. Under the umbrella of the general Plant Health Emergency Response Plan, more detailed response plans have been developed for high-priority pests such as emerald ash borer. A plan is currently in development for the Asian longhorned beetle.

Emerald ash borer: a threat to ash trees

(MDA Pest Risk Assessment score = 170, Very High)

The emerald ash borer (EAB) is an invasive wood-boring beetle found in 10 states, including Wisconsin. EAB is a devastating pest of ash trees and spreads primarily through shipments of infested firewood and other wood products. In preparation for the eventual arrival of EAB in Minnesota, the MDA led the development of the Minnesota Emerald Ash Borer Readiness Plan to coordinate EAB-related actions among agencies and groups in 2007. The Readiness Team (Table 4) continues to meet on a regular basis for planning and coordination of activities.

The MDA continued to lead risk-based detection surveys for EAB in Minnesota during 2008 with financial support from USDA Forest Service and USDA Animal and Plant Health Inspection Service (APHIS) Plant Protection and Quarantine (PPQ). MDA, PPQ and the National Park Service collaborated on placing nearly 400 purple prism traps for EAB around Minnesota (Figure 1). This is the first year the traps have been available for use in Minnesota. The MDA also created 400-plus detection trees during the spring of 2008 and when combined with detection trees left from 2007, 800-plus trees will be sampled by the end of 2008 (Figure 2). The detection surveys would not be possible without the aid of many cooperators including the Minnesota Department of Natural Resources (DNR) Parks and Forestry, Minnesota Department of Transportation (Mn/DOT), and many counties and municipalities around the state.

The MDA, University of Minnesota and the DNR collaborated on providing EAB First Detector Training in Minnesota during March and April, 2008. Seven full-day workshops on EAB were held at six locations around the state and 166 people attended and agreed to become EAB First Detectors. This was the first time that this type of training was offered for EAB in the U.S., and since then a number of states have requested information on how they might offer the same training.

The EAB field staff investigated and resolved 100-plus citizen reports of potential EAB discoveries during 2008 and also made contact with over 50 brush disposal sites (mostly in the greater Twin Cities area) to provide outreach on recognizing signs of an EAB infestation on incoming wood.

In 2009 the EAB Readiness Plan will continue to be implemented by all participating groups. EAB detection surveys will continue with purple prism traps being the primary tool used. First detector training for EAB will be repeated with additional pests potentially added.

Table 4: Minnesota Emerald Ash Borer Readiness Team membership

Board of Soil and Water Resources	Minnesota Forest Industries
Bureau of Indian Affairs	Minnesota Forest Resources Council
City of Duluth	Minnesota Forestry Association
City of Minneapolis	Minnesota League of Cities
City of Plymouth	Minnesota Logger Education Program
City of Rochester	Minnesota Society of Arboriculture
City of St. Paul	Minnesota Nursery and Landscape Association
Commercial Arborists Committee	Minnesota Shade Tree Advisory Council
County Agricultural Inspectors	Tree care companies
Firewood dealers	University of Minnesota, Entomology
Great River Greening	University of Minnesota, Extension
Minnesota Association of Consulting Foresters	University of Minnesota, Forest Resources
Minnesota Association of Soil and Water Conservation Districts	USDA Animal & Plant Health Inspection Service, Plant Protection and Quarantine
Minnesota Department of Agriculture	USDA Forest Service
Minnesota Department of Natural Resources	USDA Natural Resource Conservation Service
Minnesota Department of Transportation	Xcel Energy

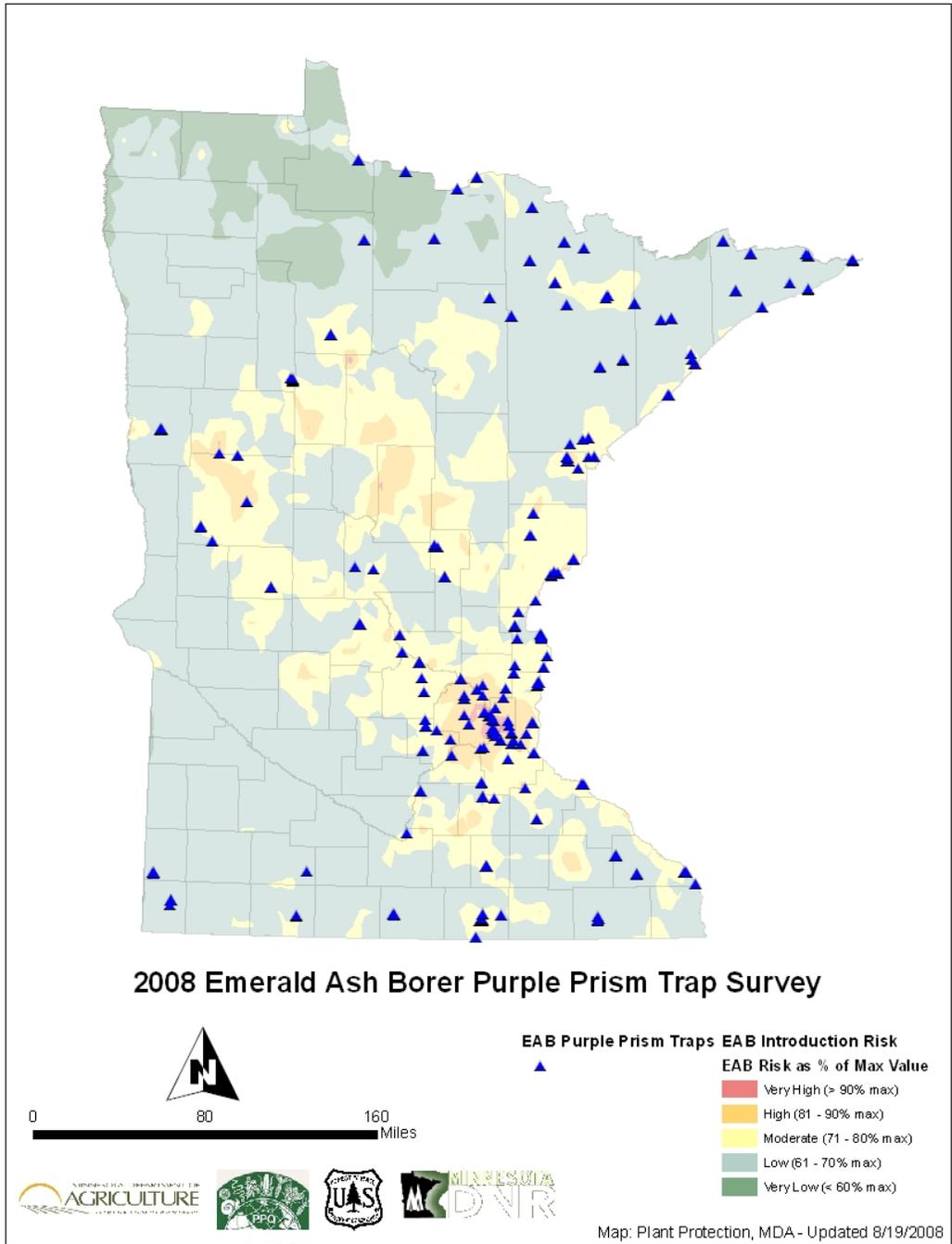


Figure 1: Trapping locations for the 2008 emerald ash borer survey.

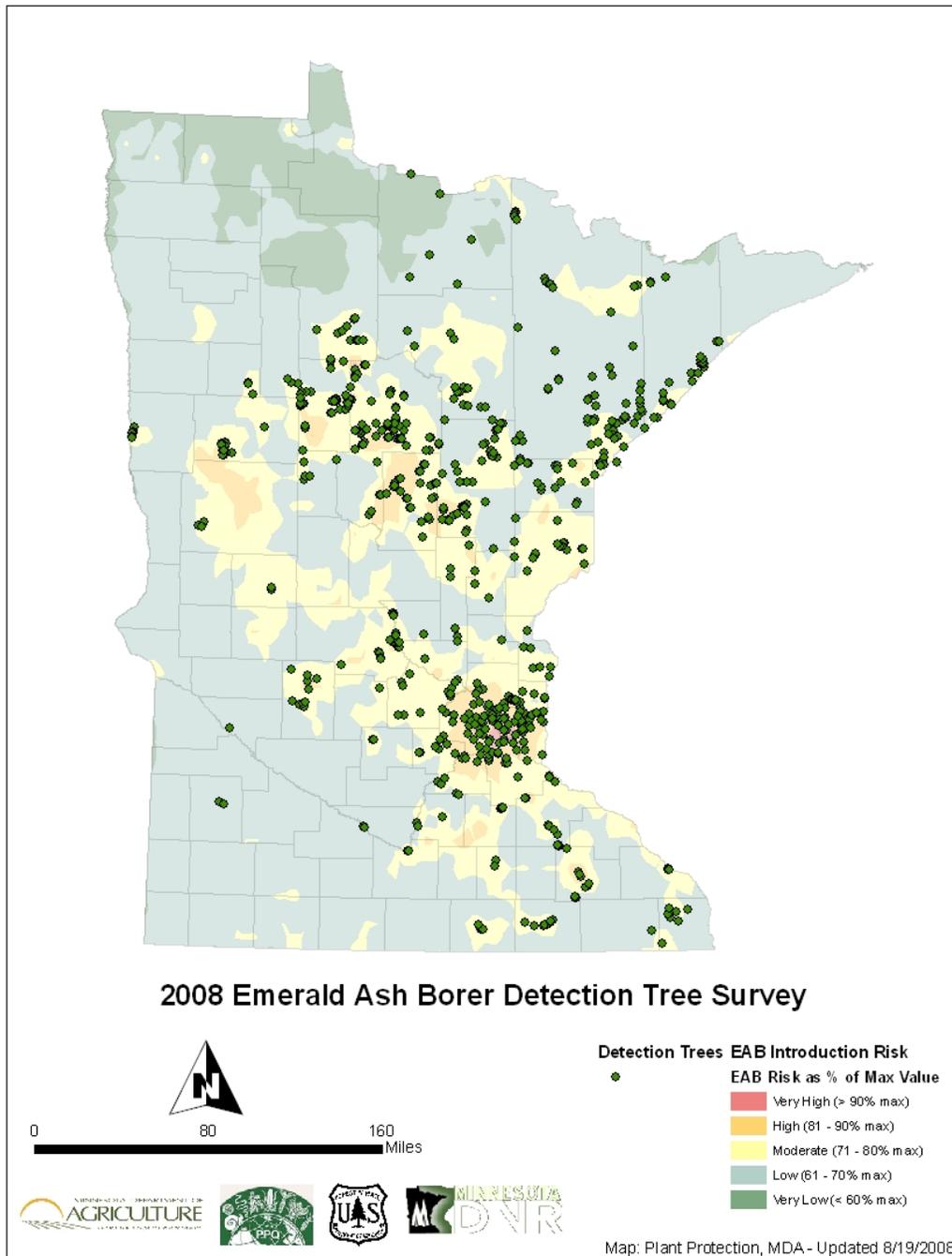


Figure 2: Detection tree locations for the 2008 emerald ash borer survey.

Potato cyst nematodes: a threat to potatoes

Potato cyst nematodes (PCN) are two species of microscopic worms that feed on the roots of potatoes. PCN have caused up to 80% yield loss in areas where they have become established. PCN are very difficult to manage. These pests can be transported to new locations by movement of soil on tubers and equipment and by water. Detection of PCN in a field can result in significant trade restrictions domestically and internationally.

Following the first detection of the pale cyst nematode in the United States in Idaho in 2006, a survey program was initiated. The objective is to perform surveys and analyses to achieve the earliest possible

detection of PCN introductions in Minnesota in order to prevent further spread of these pests. Soil samples are collected by hand or with a mechanical sampler.

A survey of fields planted to potatoes in 2006 was completed in June 2008. In total, over 1,700 5-pound samples were collected from 6,400 acres and analyzed at the MDA East Grand Forks Laboratory. Following the 2007 detection of golden nematode cysts on two seed farms in Alberta, Canada, sales records were traced back to show that in 2003 two seed potato growers in Minnesota had planted seed that came from these Alberta farms. Samples were collected from those fields and analyzed this spring and early summer. To date no PCN have been detected in Minnesota.

A survey of fields planted to potatoes in 2008 began in September. The sampling design was changed to require that more samples be collected than for the 2006 survey. Over 3,000 samples from 5,000 acres of fields planted to potatoes in 2008 have been collected (Figure 3) and are drying at the East Grand Forks facility. They will be processed this winter and sample collection will resume in the spring.

Commercial growers have welcomed the survey. One-half of Minnesota's seed potato growers have volunteered for this survey, providing over 4,800 acres for sampling. At least two of these growers are considering shipping seed to Canada and are required to have the survey done. Some seed growers do not want the survey because of the consequences of a detection of this pest. While this is understandable, given the potential for the spread and the resulting economic consequences for the potato industry in Minnesota, MDA and the National Potato Council continue to emphasize that it would be best to survey all Minnesota seed fields as soon as possible.

In 2009, samples collected in fall of 2008 will be processed in the winter and sample collection of 2008 fields will resume in the spring. It is likely that we will survey 2009 fields beginning in the fall of 2009.

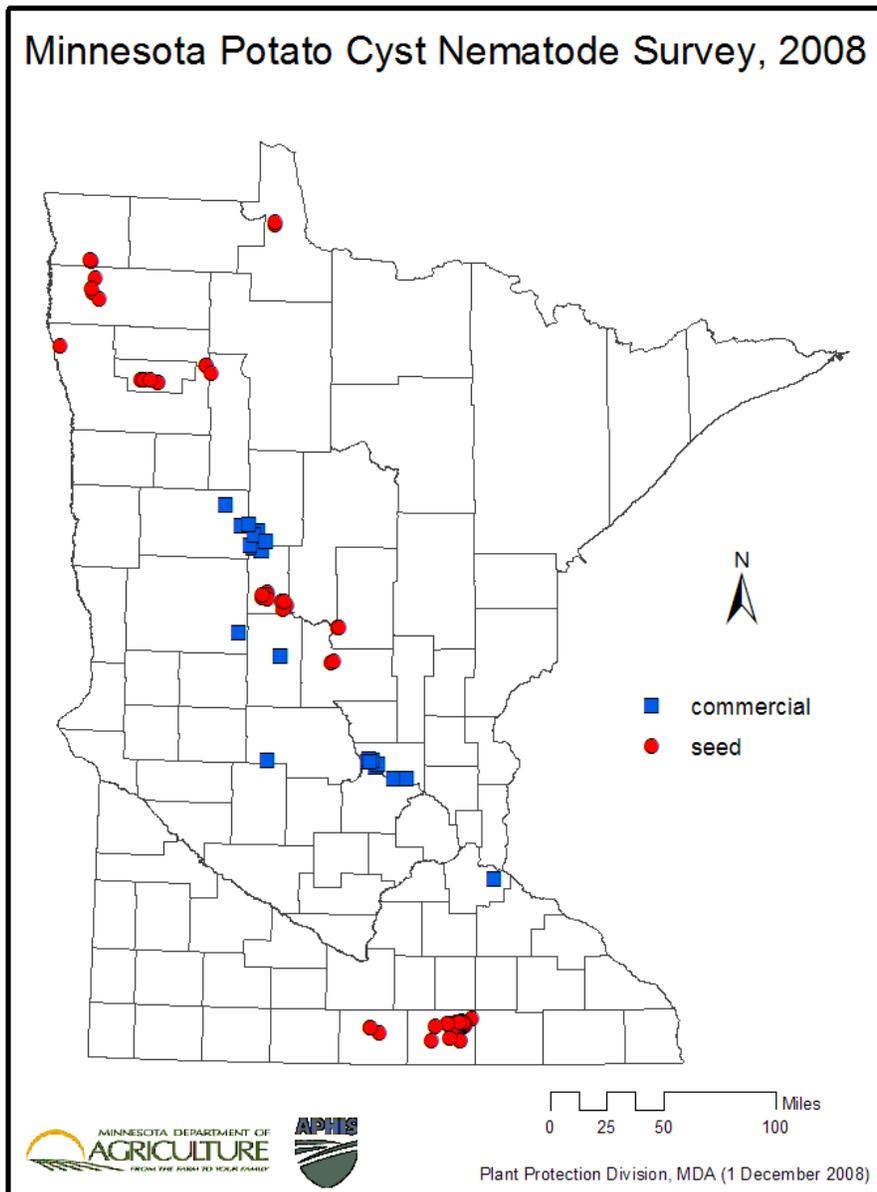


Figure 3: Fields sampled for survey of acres planted to potatoes in 2008.

Asian soybean rust: a threat to soybeans

Asian soybean rust is a potentially devastating disease of soybeans. The disease is present in Asian, Africa and South America and is caused by an invasive fungus spread by windborne spores. Soybean rust is thought to have been blown into the southern United States from South America in 2004 by Hurricane Ivan. In the following years, soybean rust has moved northward. In 2008, it was detected in more than 376 counties in 16 states. Soybean rust was as close to Minnesota as Illinois this year with positive finds in four counties. These finds were too late in the season to warrant treatment. Minnesota remains officially free of soybean rust and, unlike previous years, there were no spores detected in spore traps set up across the state this year.

To ensure that Minnesota soybean growers have the most effective tools available for dealing with soybean rust, organizations at the University of Minnesota and State of Minnesota collaborate in several areas. University of Minnesota maintains a soybean rust-monitoring program in 20 sentinel plots established throughout soybean growing areas of the state. Plots are monitored weekly for foliar

symptoms of soybean rust and deposition of soybean rust spores. Minnesota Department of Agriculture field surveyors, trained in identification of soybean rust, monitor additional soybean fields as part of the plant pest survey. If soybean rust is detected in Minnesota, this information will be publicized through the MDA. Because resistant soybean varieties are not yet available, management of soybean rust relies on timely application of appropriate fungicides. The MDA has played a leading role nationally in pursuing Environmental Protection Agency registrations for a number of fungicides needed to combat this serious disease should it arrive in Minnesota at a time when soybean yields may be threatened.

Noxious weeds / Invasive plants

The purpose of the Noxious Weed Program is to limit the spread of certain established problematic weed species, many of which are invasive. The program is administered by county and municipal governments with limited technical assistance from the MDA. The MDA provides the initial training for county agricultural inspectors, maintains the lists of species regulated as noxious weeds, and provides a proven and standardized enforcement process for county and municipal governments. Currently there are 11 species on a “prohibited” list that are to be controlled on all lands in the state. A “restricted” list contains two species that are prohibited from sale or transport in the state. However, landowners are not required to control species on the restricted list. A third list entitled “secondary” contains 51 species that are eligible for petition to a county “prohibited” list. The petition process has been used nearly 300 times by counties since its inception in 1975 to either add or subtract 35 of the species on the “secondary” list to county primary lists in 63 of the state’s 87 counties.

In addition to the Noxious Weed Program, exotic plants not known to occur in the state or that occur here with limited distributions are targeted for exclusion. The largest landowner of a site infested with cut-leaved teasel was ordered to treat the weed on their property by mid-May. A follow-up inspection conducted in late May showed that the treatment was only applied to a narrow strip along the streets. In the small area treated, nearly all the teasel plants had been killed. An additional treatment was ordered on the remainder of their property, but the late-May timing resulted in a considerably lower control of the teasel plants and one fairly small area was missed in the treatment. As a result some of the teasel plants bloomed and some seed may have been produced. MDA and Ramsey County officials conducted follow-up inspections and cut seed heads to try to prevent seed production, and the Ramsey County Cooperative Weed Management Area treated the site in October 2008 to eradicate the rest of the teasel plants. The site will need to be monitored for the next four years and any teasel plants killed to ensure eradication.

The Ramsey County Cooperative Weed Management Area was organized and cooperating members were trained on the identification of “early detection” weeds of interest to the county and the MDA. The group is using the MDA GIS-based early detection reporting tool to help map detections of these species with the objective of following up with management of the isolated populations. This group has been very involved in the cut-leaved teasel eradication in Roseville.

A resident in south Minneapolis reported black swallowwort growing along a fence after finding information on the MDA website. A follow-up visit confirmed that it was black swallowwort and the resident was given information on how to control the plant.

Gypsy moth: a threat to many species of trees

The gypsy moth was introduced to the United States in 1869 in Massachusetts. Since its escape into the wild, this species has become known as the most destructive forest defoliator in the country. As established populations spread west across the country, states must be prepared for the impact this insect

will have on the natural resources, economies, and the citizens within their borders. Fortunately, the MDA and its partner organizations have been effective at detecting and eradicating small, start-up populations of this pest for 30 years. In recent years, MDA has conducted successful eradications in communities such as Edina, Minneapolis, Golden Valley, Grand Marais, Grand Portage and Silver Bay.

The Slow the Spread (STS) program of the National Gypsy Moth Project is designed to consolidate federal and state resources into a cohesive program to combat the expansion of the gypsy moth population across many states. The National Gypsy Moth Program encourages collaboration between the MDA and other state, federal, tribal and local agencies.

The MDA remains the lead agency for gypsy moth prevention, early detection, and rapid response as the gypsy moth moves from western Wisconsin into the eastern part of Minnesota. The Gypsy Moth Program Advisory Committee (GMPAC) was formed to provide a forum for contributing partner agencies (MDA, DNR, USDA APHIS PPQ and USDA Forest Service). This advisory group meets twice annually, and representatives are encouraged to start dialogue within their respective agencies to continue discussions about gypsy moth and solicit ideas and comments to take to the larger group.

Steps were taken this year to distribute educational materials across the state to both businesses and private citizens. Informational brochures were circulated throughout the state park network and travel information centers across Minnesota. Instructional DVDs were produced in 2006 to address the main concerns of both the timber and nursery industries.

Gypsy moth prevention through regulatory work was achieved through compliance agreements with mills and nurseries that import regulated articles from the gypsy moth-quarantined area. GMPAC created a risk rating system for regulatory sites and the highest-risk sites are surveyed in the summer by the trapping program. The STS regulatory committee makes recommendations and opens the lines of communication between states as to ways of tackling regulatory issues that maximize resources.

While major gypsy moth infestations cause noticeable damage to trees, it can be more difficult to detect small, start-up populations. The MDA monitors for gypsy moth infestations by establishing a network of cardboard traps baited with the gypsy moth pheromone. These highly effective traps draw in male moths, which are then caught on the sticky interior of the trap and are unable to escape.

Traps are set, checked and removed by MDA seasonal employees. The traps are collected in the fall and the moths are counted. Collection data are entered into a GIS and analyzed for indications of a start-up moth infestation. In 2008, staff deployed 20,188 traps around the state (Figure 4).

The 2008 trapping program found moth numbers at the highest levels ever recorded in Minnesota (Figure 4). Particularly large infestations were detected in the northeast and southeast counties. Carlton County saw a 66-fold increase in moths compared to last year. Two residential sites in the Twin Cities metro area trapped extremely high numbers of moths. The MDA responded by searching for alternate life stages and recovered several female moths and egg masses from both sites, indicating isolated reproducing populations. Two regulatory sites were also found to be infested with gypsy moths, prompting MDA to stop the sale of the infested stock and require insecticidal treatments before selling it in the spring.

In recent years, moth catches have been on the rise. The 2008 increase may be attributed to advancing populations from the east. The MDA will work closely with other state and federal agencies, cities, landowners and nursery managers within these areas to align management strategies with the increased pest pressure. Most of the detections will be further delimited in 2009, but eradication treatments are

proposed for the Twin Cities metro area sites and STS treatments will be proposed for several sites in both northeast and southeast Minnesota.

Responses to the gypsy moth populations are formulated based on trap catch data and available funding through the Slow the Spread program and USDA APHIS. Federal funding for 2009 through STS and APHIS for survey and delimits has yet to be approved, but the MDA anticipates amounts to be equal to those received in 2008. Rapid response management options will be considered with the assistance of state and federal partner agencies. The MDA has proposed treatment of more than 100,000 acres in 2009 based on moth catches from 2008.

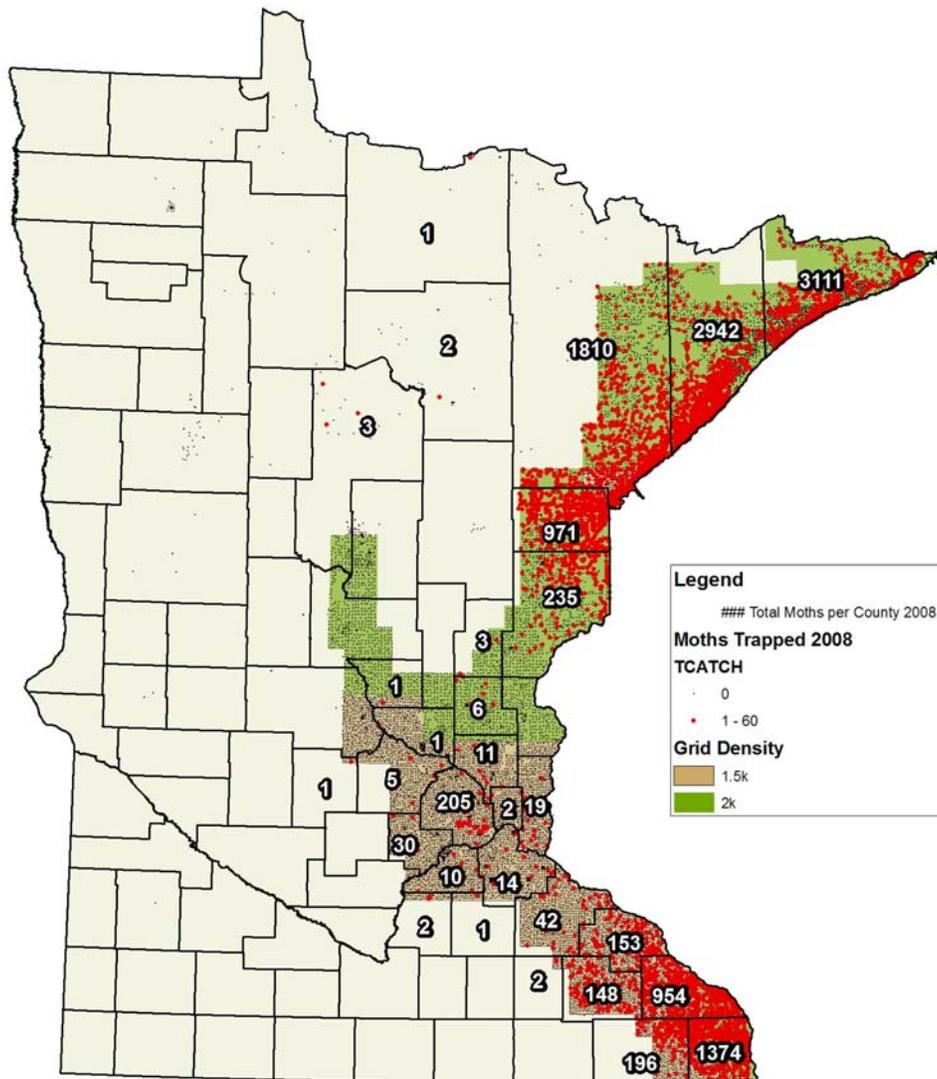


Figure 4: Gypsy moth catches by county

Risk of firewood movement

Movement of firewood can transport invasive pests rapidly over long distances. As part of our goal of excluding new invasive species from entering Minnesota, in 2005 the MDA initiated a firewood program that began with an informal survey of visitors to North Shore state parks. The survey asked about invasive species awareness, behavior regarding movement of items like firewood that can spread invasive species, and media habits. The survey was repeated in September 2008, and the number of

people who reported bringing firewood from home to their camping location decreased substantially since 2005.

A mailing was sent to 100,000 out-of-state hunters and anglers who purchased Minnesota licenses during the past year, asking them to not bring firewood to Minnesota. This project was implemented jointly between the MDA, USDA APHIS PPQ and the DNR. The mailing was sent in October 2008 to reach deer hunters before they traveled to Minnesota for the opening of deer hunting season.

Firewood inspections were carried out at 50-plus entities selling firewood. The businesses inspected ranged from big-box stores to more informal firewood sales by tree care companies. Inspections are conducted to determine the source and route of the wood, check for compliance with interstate quarantines and state labeling requirements, identify individuals and businesses in the state distributing or offering firewood for sale, and educate sellers on risks of spreading invasive species in firewood. Inspections are focused on areas of Minnesota considered high risk for introduction of invasive pests. Initially, many labels were out of compliance in that they did not meet the new (2007) requirement to list the county and state of harvest. Toward the end of the year, we were encouraged to see that most labels are meeting this requirement. This labeling requirement is now being considered by other states and even at the federal level.

The Interagency Firewood Group, made up of representatives from the DNR, USDA APHIS PPQ and the University of Minnesota continued to meet to organize our activities and share results. Because EAB is the pest of greatest concern at this time and because some of the objectives of both the firewood and EAB programs overlap, the Interagency Firewood Group was recently incorporated into the EAB Readiness Plan program. This year, a collaborative project was initiated with University of Minnesota researchers who are conducting research on human-mediated spread of invasive species

In 2009 inspections efforts will be increased as known EAB infestations creep closer to Minnesota. Outreach efforts will continue and expand to additional industries potentially affected by EAB quarantines.

Plant pest survey: a survey for crop pests

Fields of corn, soybean, small grains, alfalfa and sunflower were surveyed for numerous pests. Pests targeted in the survey include native and invasive insects and pathogens. Examples of targeted invasive pests can be found in Table 5. During 2008, 2,959 fields were surveyed. In addition, two soybean pathogen surveys and one corn pathogen survey were conducted in collaboration with the Plant Pathology Department at the University of Minnesota. Data from these various surveys were used to publish nine weekly reports on crop pest conditions throughout Minnesota. In addition, Plant Pest Survey staff supported the Export Certification Program by inspecting corn and soybean fields for pests of export concern.

Returning field surveyors will continue to monitor invasive and native agricultural pests during the 2009 growing season. To increase efficiency, field surveyors will be cross-utilized among the various surveys.

Table 5: Invasive pests targeted in Plant Pest Survey

Invasive pest	Associated crop
Alfalfa weevil	Alfalfa
European corn borer	Corn
Cereal leaf beetle	Small grains
Orange wheat blossom midge	Small grains
Soybean aphid	Soybean
Japanese beetle	Soybean
Brown marmorated stink bug	Soybean
Imported longhorn weevil	Soybean
Soybean pod borer	Soybean
Soybean rust	Soybean
South American fruit tree weevil	Alfalfa, Soybean
Cucurbit/Chrysanthemum beetle	Corn, Soybean
Wheat bug	Small grains

Exotic wood-boring insects: a threat to many species of trees, particularly pines

(MDA Pest Risk Assessment score for Sirex wood wasp = 121, High)

The Minnesota Cooperative Agricultural Pest Survey Committee (MDA, DNR, USDA APHIS PPQ, USDA Forest Service, and University of Minnesota) identified exotic wood-boring insects as being a high priority for survey because of their high risk for invading Minnesota and causing damage. Bark beetles rank among the most destructive forest pests, and the Sirex wood wasp has caused up to 80 percent mortality of pine trees in other countries.

Trapping for exotic wood-boring insects was focused around the Twin Cities metropolitan area and the Duluth area because of the increased likelihood of the pests being introduced to these areas through the movement of solid wood packing material. A total of 70 bark beetle traps were deployed over 35 locations (Figure 5), and 77 Sirex wood wasp traps over 38 locations (Figure 6). Traps were checked every two weeks from April to October. In total, 1,939 samples were collected and processed. None of the targeted exotic wood borers were detected in 2008.

In addition, 20 trap trees were established for the Sirex wood wasp at five locations (four trees per location) (Figure 6). These trap trees were chemically stressed to attract the Sirex wood wasp. The trap trees will be felled and dissected next spring to search for signs of infestation.

This survey effort for exotic wood borers was coordinated with a survey being conducted by the USDA APHIS PPQ (Figures 5 and 6). The cooperation of various land owners to allow us to trap on their property made this survey possible. Specifically, the National Parks Service deployed and checked the traps in Chisago County. This survey was partially funded by the USDA Forest Service and the USDA APHIS PPQ. Furthermore, a collaborative project was initiated with University of Minnesota researchers conducting research on increasing landowner participation in surveys for Sirex wood wasp.

As of 2008, MDA has conducted major surveys for exotic wood borers for five years running. It is typical to focus on one high-risk pest for several years, and then switch to another, based on new risks and introductions in other states. In 2009 the survey will likely focus on the Sirex woodwasp, depending on federal funding. Funds from the USDA APHIS PPQ previously used for the exotic wood borers will be used for a new exotic cereal cyst nematode survey in 2009.

Minnesota Exotic Bark Beetle Survey, 2008

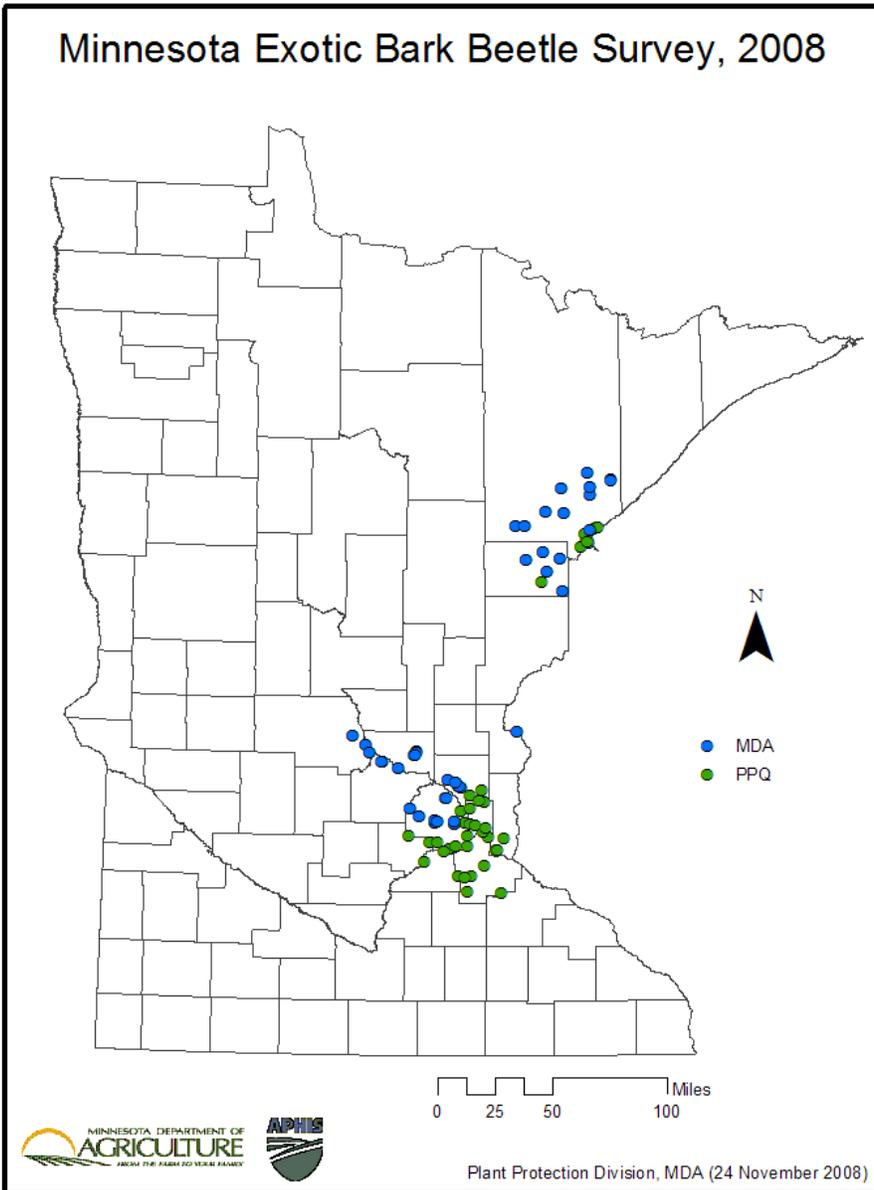


Figure 5: Trapping locations for the 2008 exotic bark beetle survey.

Minnesota Sirex Wood Wasp Survey, 2008

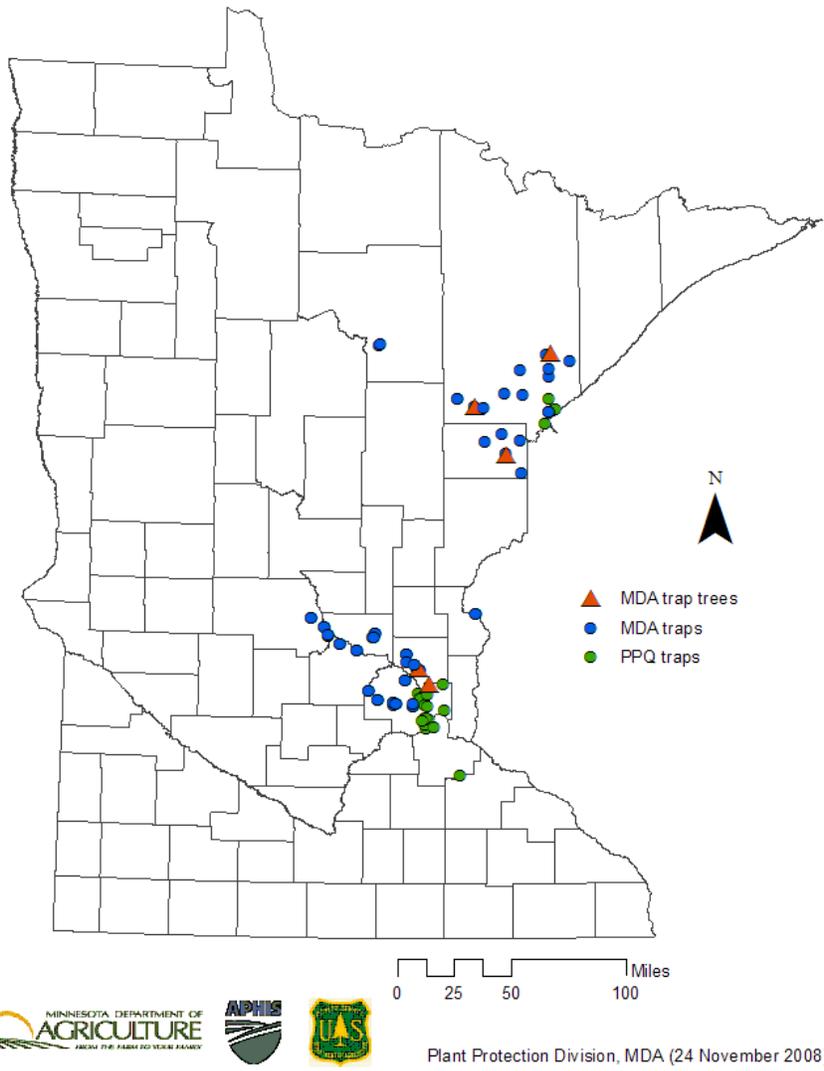


Figure 6: Trapping locations for the 2008 Sirex wood wasp survey.

Karnal bunt: a threat to wheat

Karnal bunt is a devastating fungal disease of wheat that has significant trade implications. The fact that the MDA has surveyed for and not detected this pest for over 10 years has allowed Minnesota to continue exporting its wheat. The survey for 2008 consisted of 57 samples taken from 11 counties, including Big Stone, Chippewa, Grant, Kittson, Marshall, Norman, Polk, Pope, Red Lake, Stevens, and Wilkin (Figure 7). Samples were collected by the MDA and sent to a USDA laboratory for processing and screening. Karnal bunt was not detected in Minnesota's 2008 wheat crop. This survey was partially funded by the USDA Forest Service and USDA APHIS PPQ. In 2009, the Karnal bunt survey will continue.

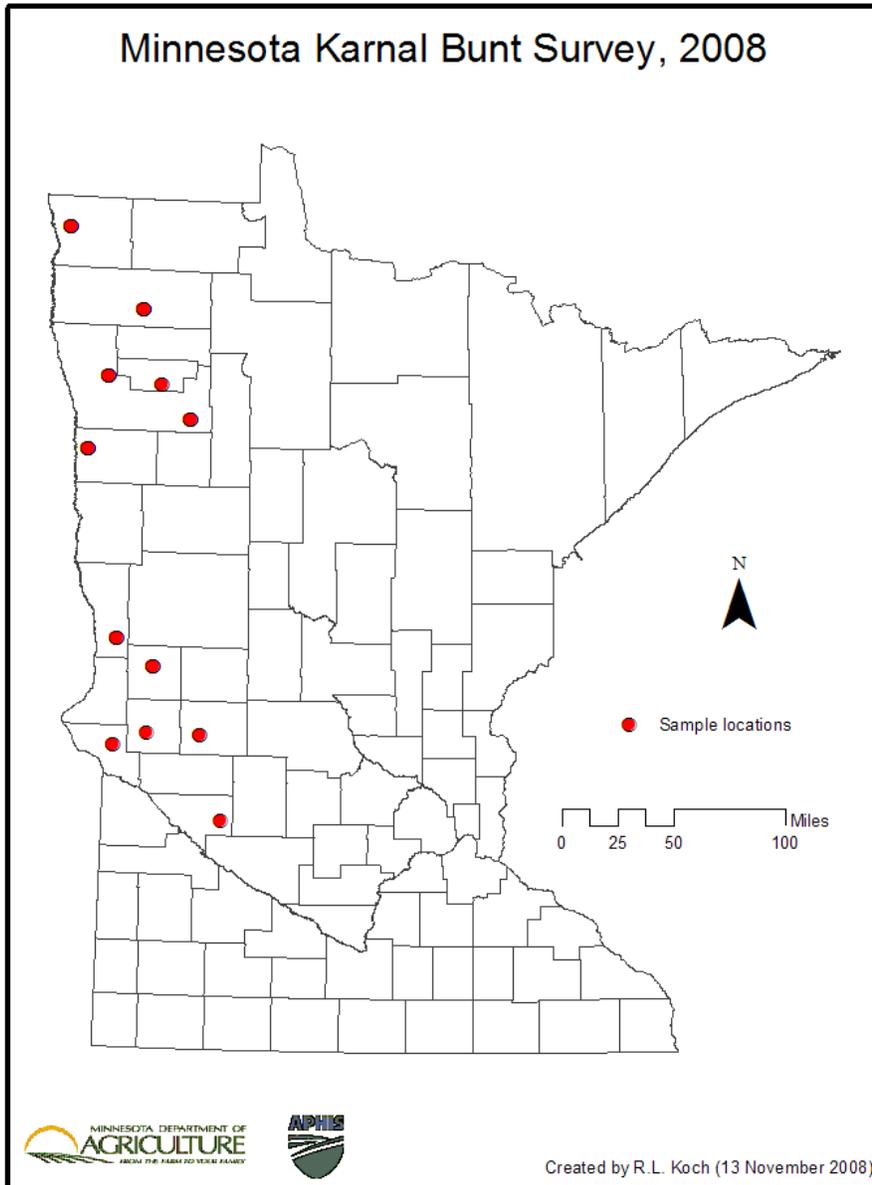


Figure 7: Sample locations for the 2008 Karnal bunt survey.

Light brown apple moth: a threat to many species of crops and trees

Light brown apple moth, currently established in Hawaii and under an eradication program in California, is known to attack over 250 different species of plants. In Minnesota, trapping efforts for the light brown apple moth focused on nurseries as these facilities provide a likely means of transporting light brown apple moth to Minnesota from infested areas in California. Priority was placed on nurseries in Minnesota reporting to have received stock from infested counties in California and then other at-risk counties in California (Figure 8). A total of 50 Jackson traps (baited with pheromone) were allocated to Minnesota. These traps were deployed at rates of one to three traps per nursery at 29 nurseries. Trapping was conducted from July to September. Light brown apple moth was not detected in Minnesota in 2008. This survey was partially funded by the USDA APHIS PPQ. The light brown apple moth survey will continue in 2009 if federal funding is made available.

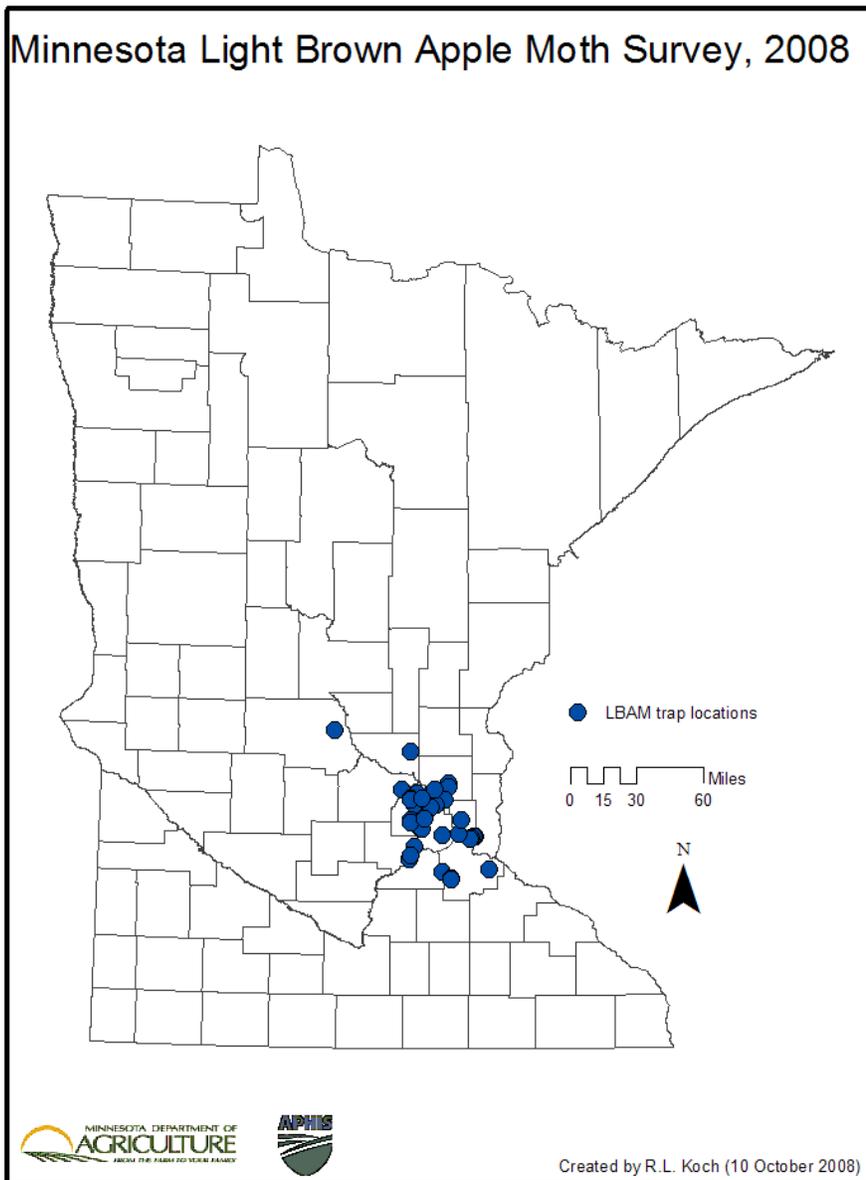


Figure 8: Trapping locations for the 2008 light brown apple moth survey.

Swede midge: threat to canola, cabbage, broccoli and cauliflower

(MDA Pest Risk Assessment score = 121, High)

Swede midge is a tiny, invasive fly whose larvae feed on cabbage, canola and other related plants in eastern North America. MDA collaborated with the University of Minnesota to place a total of 13 traps at 12 locations in Minnesota (Figure 9). In northwestern Minnesota, traps were placed in canola fields. In eastern Minnesota, traps were placed in cabbage, broccoli and cauliflower fields. To date, Swede midge has not been detected in Minnesota. We have begun collaborating with University of Minnesota researchers who are conducting research on increasing landowner participation in surveys for Swede midge.

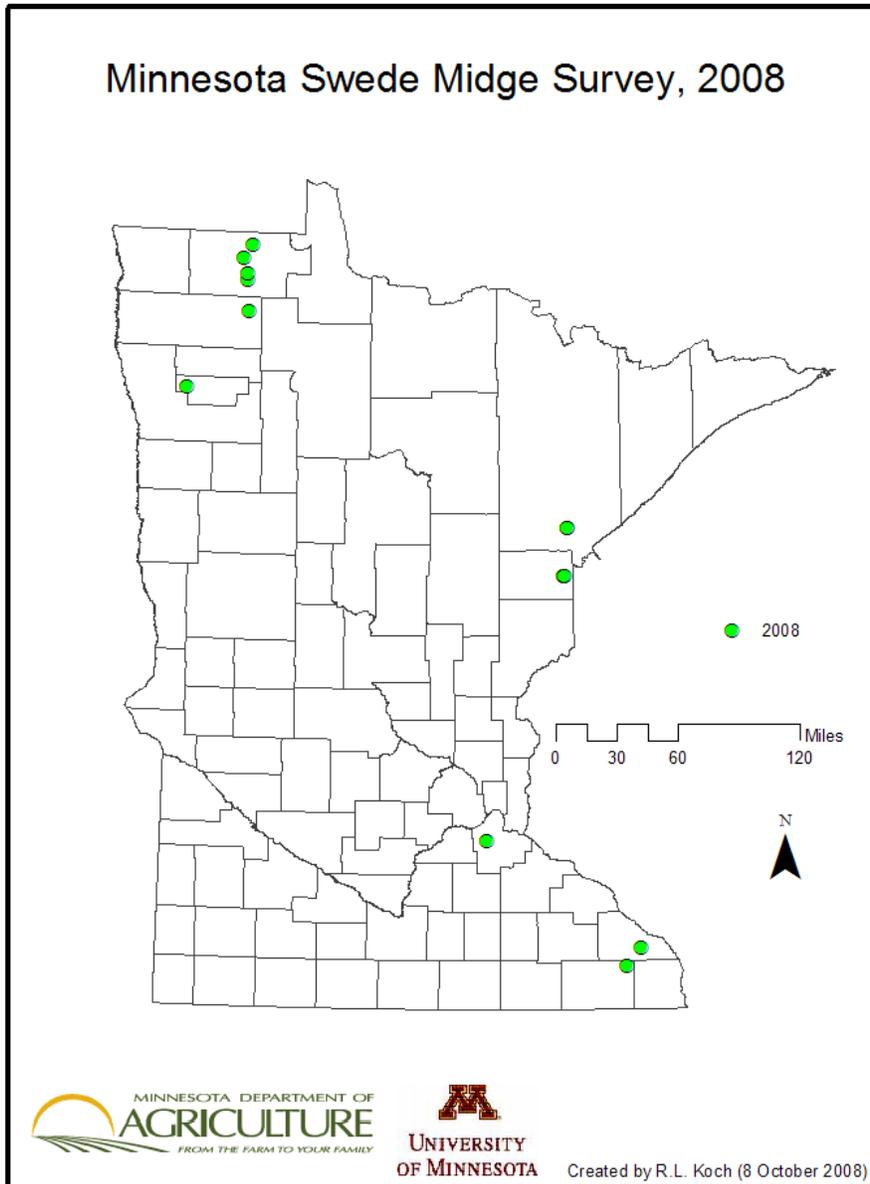


Figure 9: Trapping locations for the 2008 Swede midge survey. (The point in St. Louis County represents two survey locations.)

Commodity and commodity-like surveys and regulation

Nursery stock

Nursery stock is a well-known pathway for the movement of invasive pests to new areas. Nursery inspections are conducted at retail sales locations and holding areas to ensure stock coming into Minnesota is free from pests. Inspectors also review certification documents to ensure that plants shipped from areas under state and/or federal plant pest quarantines are certified at origin to comply with the applicable quarantines. In addition, inspections are conducted on nursery stock intended for export to ensure that the stock is free from pests as requested by the destination state or country. Invasive pests targeted in the nursery inspections include but are not limited to those listed in Table 6.

Table 6: Invasive pests (insects, pathogens/diseases and weeds) targeted in nursery inspections

Emerald ash borer	Asian longhorned beetle
Apple tortix	Gypsy moth
Japanese beetle	European wood wasp
Viburnum leaf beetle	Chrysanthemum white rust
Daylily rust	Sudden oak death
Buckthorn	Purple loosestrife
British yellowtop	Giant hogweed

Potato

The MDA Potato Certification Program monitors seed potato fields for viral, bacterial and fungal diseases as well as weeds, insects and nematodes (such as potato cyst nematode). This certification program is necessary to maintain export opportunities domestically and internationally.

Fruits and vegetables

Fruits and vegetables are delivered to Minnesota from around the world. The MDA conducts necessary inspections to verify the quality and condition of the produce. Among the problems looked for in these inspections are signs of insect or pathogen infestation or infection. These inspections protect Minnesota from potential invasive pests entering the state on produce.

Seed

To prevent the introduction and spread of noxious weeds, the MDA enforces restrictions on noxious weed content in seed sold in the state. This effort covers agricultural seed, lawn and garden seed and wildlife forage seed mixes. Noxious weeds are classified as either prohibited or restricted (Table 7). Prohibited noxious weeds are not allowed in any amount in seed lots. If found, sale is stopped and the labeler is ordered to dispose of the seed lot or recondition the lot to remove the contaminant. In contrast, limited amounts of seed from restricted noxious weeds are allowed. If detected at densities above the threshold, the labeler is ordered to correct the violation before sale may continue. Restricted noxious weed seed must be declared on the label. Labels and samples from all types of seed are reviewed by staff located throughout the state.

Table 7: Prohibited and restricted noxious weeds targeted in seed samples

Prohibited noxious weeds	Restricted noxious weeds
Bull thistle	Buckthorn plantain
Canada thistle	Dodder
Musk thistle	Field pennycress (or Frenchweed)
Perennial sow thistle	Hoary alyssum
Plumeless thistle	Horse nettle

Field bindweed
Hemp
Leafy spurge
Perennial peppergrass
Russian knapweed

Wild mustard
Quackgrass
Wild radish
Giant foxtail
Eastern black nightshade

Export certification

The MDA Export Certification Program conducts inspections and provides certification to verify that Minnesota's exports comply with import regulations of certain foreign countries. The MDA facilitates trade by ensuring that our commodities are free from pests that could become invasive in other countries.

Integrated pest management (IPM)

Integrated Pest Management (IPM) is the process of controlling and reducing pest problems by considering the full set of factors that contribute to pest pressure. It seeks to prevent pests from being attracted, having access or having the means to remain and reproduce in an area. It may include pesticide treatments but it can also include sealing of cracks in foundations, limiting natural cover or food for pests, and using non-chemical controls. The MDA IPM Program develops and implements statewide strategies for increased use of IPM on private and state-managed lands. Pests targeted by this program include established invasive pests. The program provides pest management education, outreach, research, and survey. Partners include growers, producers, academic research institutions, federal and state government agencies, counties, and local municipalities. This program has the following three components:

Fruit and vegetable IPM

The MDA partners with the Minnesota Apple Growers Association and the Minnesota Fruit and Vegetable Growers Association. In 2008 the MDA surveyed for seven native insect pests in apple orchards in the primary apple growing regions of Minnesota.

Weed IPM

The MDA staff helps landowners and land managers develop practical IPM strategies for fighting invasive plant species in Minnesota. In 2008 biological control programs were continued for leafy spurge and spotted knapweed. These programs have been ongoing for more than a decade in Minnesota and have been highly successful in providing counties, townships, and cities with a cost-effective and sustainable approach to managing noxious and invasive weed species. The MDA also continues to lead U.S. efforts in developing an international biological control program in cooperation with CABI BioSciences (Switzerland) for common tansy, a newly emerging weed pest in Minnesota. In addition to biological control activities, the MDA provides technical resources for the development of mapping strategies for invasive weed species and is currently working with several Cooperative Weed Management Areas to establish mapping protocols throughout the state. The MDA is also active in weed management education and outreach for professional land managers and is also involved with several research projects dealing with invasive weed species.

Insect Biological Control

The MDA collaborates with other entomology labs, other biocontrol programs, and growers to study and refine insect rearing methods as well as enhance techniques for commercially available biological control agents. A rearing program was developed for a parasitic wasp, *Binodoxys communis*, which was recently approved for release against soybean aphid, an established invasive pest of soybean.

Quarantine Facility

The Minnesota Agricultural Experiment Station (MAES)/Minnesota Department of Agriculture (MDA) Containment Facility (i.e., quarantine facility) is the only one of its kind in the Midwest. This facility offers research space with advanced containment features to prevent escape of foreign species into the environment. The Biosafety Level 2 quarantine facility opened in 2003. Research projects conducted in this facility include screening of potential biological control agents for invasive pests such as soybean aphids, garlic mustard, and buckthorn. In addition, the newly constructed Biosafety Level 3 facility opened in 2008 for research on pathogens.

Laboratory

Laboratory support continues in response to regulatory issues. In 2008 the laboratory responded to a trace forward the USDA APHIS PPQ issued on stock from a California nursery potentially infected with the regulated organism, *Phytophthora ramorum*, the causal agent of sudden oak death. Final analysis showed the stock was free of *P. ramorum*. Other laboratory analyses include the presence or absence of disease for export certification and nursery survey and licensing as well as plant pest surveys. The laboratory also provides protocol support, laboratory space and equipment to division staff.

Staff received training in molecular techniques for detection of federally regulated organisms, *Ralstonia solanacearum* and the potato cyst nematodes, *Globodera pallida* and *G. rostochiensis*.

In 2009 updated protocols for current laboratory procedures will be provided and made available on the Laboratory Service Divisions document control system. In addition, laboratory support will be provided for processing soil samples for the cereal cyst nematode survey included as part of the plant pest survey.

Permit applications and inspections

The MDA reviews federal permit applications from businesses and individuals who want to import certain living organisms into Minnesota. This includes plant pest and biological control insects, plant pathogens and other fungi and bacteria, snails, certain plants, and soil, as regulated by USDA APHIS PPQ. As part of the federal permitting process, the MDA is asked by PPQ to review and comment on the organisms and the conditions under which they will be used and maintained once in the state as well as their final disposal. If there are concerns, the MDA recommends changes to the permit. Most often, PPQ agrees to make those changes. Once a permit is issued, the MDA is notified. A copy of the permit along with the original application is stored in our database. Most of the permitting process is done through an online system supported by PPQ. In 2008 over 63 permit applications were reviewed.

Some of the organisms for which permits are requested are for research purposes. For example, a plant pathogenic fungus may be brought into Minnesota for disease resistance research. Soils are brought in for various physical and chemical analyses. Other organisms, like certain butterfly species, are imported for sale or release at events.

Occasionally, a permit application review will require an inspection of the facility where the work is to be conducted. The MDA and USDA APHIS PPQ staff will participate in these together. For example, the MDA served on the review committee for the new Biosafety Level 3 facility at the University when they applied for a permit.