INVASIVE SPECIES

Legislative Report for Calendar Year 2007

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CONTENTS

INTRODUCTION

Minnesota Statute Section 18G.12, subd.5 [2007] requires reporting on harmful terrestrial invasive species to the chairs of legislative committees that have jurisdiction over environmental and agricultural resource issues. This report is intended to fulfill this statutory requirement by summarizing activities of invasive species programs within the Minnesota Department of Agriculture (MDA) during calendar year 2007. In specific, the report provides:

1) *an overview of accomplishments achieved by MDA invasive species programs,*

2) *information on expenditures (FY 2007),*

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 2008.*

Invasive species are non-native organisms (e.g., insects, plants, pathogens) that cause or may cause economic or environmental harm. In the United States, total damages, losses and control costs attributed to invasive pests amount to over $135 billion per year. Of this, the costs associated with agricultural (crop and pasture) and forest pests are greater than $68 billion and $4 billion per year, respectively. Furthermore, invasive species are regarded as the fastest growing threat to biodiversity. According to studies by Wilcove et al. (1998) and others, biological invasions are second only to habitat loss in human-related "causes of extinction." For these reasons, the unintentional import of invasive pests has become an international trade issue. In other words, other countries do not want our invasive pests and we do not want theirs.

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) on the horizon makes these MDA programs essential to the well-being of the state. To attain these goals, the MDA's efforts for invasive species management are focused 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 then rapidly and appropriately responded to in order to mitigate any further harm.*

3) *Control and Management: established, widespread invasive species are suppressed as needed to mitigate harm.*

Invasive species are a critical issue economically and environmentally, and the scope of issues generated by invasive species is extremely broad. The magnitude of the invasive species problem is so great that no agency alone can address it adequately. Therefore, the MDA collaborates regularly with other entities, both private and public, 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. This "swarm of bees" approach, which involves attacking many different aspects of the problem, has been highly effective in the past. In meetings of the Minnesota Invasive Species Advisory Council, council members (representing most levels of

government, non-profits and private organizations, Table 1) give reports on their specific efforts to combat invasive species. This advisory council facilitates 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*
- *Leech Lake Band of Ojibwe*
- *Minneapolis Parks and Recreation Board*
- *Minnesota Association of County Agricultural Inspectors*
- *Minnesota Board of Water and Soil Resources*
- *Minnesota Crop Improvement Association*
- *Minnesota Department of Agriculture*
- *Minnesota Department of Natural Resources*
- *Minnesota Department of Transportation*
- *Minnesota Farm Bureau*
- *Minnesota Forestry Association*
- *Minnesota Golf Course Superintendents Association*
- *Minnesota Native Plant Society*
- *Minnesota Nursery and Landscape Association*
- *Minnesota Shade Tree Advisory Committee*
- *National Park Service*
- *Superior National Forest*
- *The Nature Conservancy*
- *University of Minnesota*
- *USDA Animal & Plant Health Inspection Service, Plant Protection and Quarantine*
- *USDA Forest Service*
- *USDA Natural Resource Conservation Service*
- *U.S. Fish & Wildlife Service*

EXPENDITURES

Both general fund and federal dollars are included in the tables below (Tables 2 and 3). The majority of the general fund expenditures are for program development and survey efforts across the state. Program development includes interagency meetings, survey planning, surveyor training, response planning, program coordination and other overhead. Administration includes breaks, personnel matters, etc. Survey includes planning, field time, equipment, data analysis and other overhead. This year's costs for education are printed material and distribution, billboards, public meetings and informational meetings, including training for county and township agricultural inspectors. Inspections included planning, Karnal bunt wheat sampling, potato cyst nematode sampling, firewood dealer inspections, federal permit follow-up inspections, and response to reports from the public. Research is focused on the development of pest risk assessments and a regional pest risk assessment process.

TABLE 2

MDA invasive species expenditures, FY2007

Activity	Dollars spent FY2007	Percent of total
Administration	*$577,870*	*32%*
Education	*$361,982*	*20%*
Management (gypsy moth July 06)	*$213,849*	*12%*
Inspection	*$154,358*	*8%*
Survey	*$469,869*	*26%*
Research	*$30,871*	*2%*
TOTAL	**$1,808,799**	**100%**

The table 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, FY2007

ACTIVITY	GENERAL FUND	FEDERAL FUND	TOTAL
Invasive species	*$655,393*	-	*$655,393*
Gypsy moth	*$419,977*	*$354,271*	*$774,248*
Plant pest survey (10%)	*$24,382*	-	*$24,382*
General survey (USDA CAPS)	*$19,766*	*$99,324*	*$119,090*
Emerald ash borer	*$73,888*	*$54,323*	*$128,211*
Exotic bark beetles	*$5,075*	*$24,557*	*$29,632*
European wood wasp	-	*$7,517*	*$7,517*
Potato cyst nematode	-	*$54,266*	*$54,266*
Karnal bunt	*$6,962*	*$6,100*	*$13,062*
Noxious weed	*$2,998*	-	*$2,998*
TOTAL	**$1,208,441**	**$600,358**	**$1,808,799**

PROGRAM SUMMARIES

Plant Health Emergency Response

The MDA developed a response plan for plant health emergencies. The Plant Health Emergency Response Plan provides a framework that will 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 scope of the particular incident. The plan stresses state and federal interagency cooperation which is essential to respond rapidly to such plant pest threats. Plant Protection staff has received training on use of the response plan, as well as National Incident Management System training. Under the umbrella of the general Plant Health Emergency Response Plan, more detailed response plans have been developed for particular pests. For example, a response plan was developed and tested for emerald ash borer.

Emerald Ash Borer

Emerald ash borer is an invasive wood-boring beetle that has killed more than 20 million ash trees in Michigan, Indiana, Ohio and Illinois since its discovery in Detroit in 2002. Currently, this insect is not known to occur in Minnesota.

In preparation for the potential arrival of emerald ash borer, the MDA led the development of the Emerald Ash Borer Readiness Team which consists of representatives from state and federal agencies, local governments, universities, affected industries and non-profit groups (Table 4). The Readiness Team initiated the creation of the Emerald Ash Borer Readiness Plan to guide actions to be undertaken against this pest in Minnesota. One chapter of the Readiness Plan is the Emerald Ash Borer Response Plan. The Response Plan details the steps that will be taken when this pest is detected in Minnesota, what agencies will fill what roles and what criteria will be used to determine response actions. To evaluate the Response Plan, a full-scale, in-field response exercise was held on June 28, 2007, at Moir Park in Bloomington for a mock detection of emerald ash borer. Much was learned from the exercise. The Readiness Team continues to meet on a regular basis.

TABLE 4

Minnesota Emerald Ash Borer Readiness Team membership

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

The risk-based detection survey was continued in 2007 with support by USDA Forest Service and USDA Animal and Plant Health Protection Service. Additional partners in the survey effort included the Department of Natural Resources, Department of Transportation, over 50 municipalities and counties and approximately 100 private campgrounds in Minnesota. With no effective traps available for detection of this pest at the start of the survey, the MDA relied on detection trees for early detection. Detection trees are ash trees that have had a band of bark removed from the circumference of the trunk (i.e., girdling), which makes the trees attractive to emerald ash borer. The detection trees are then felled and peeled later in the year or the following year to search for signs of infestation. Over 900 detection trees were sampled during 2007 and found to be negative for EAB. Moreover, almost 400 more detection trees were created and will be ready for sampling in 2008. In addition, the MDA received numerous reports of suspected emerald ash borer infestations. All reports were followed up by sending diagnostic information to the person reporting the infestation and conducting a site visit if necessary.

First detections of invasive species in new areas are often made by the general public or practitioners in the field. Because of this, outreach and training on what pests to look for and how to report them is an important component of the early detection program. For example, tree inspectors and other workers in the tree care industry may be the first to discover a forest pest such as emerald ash borer. Plastic wallet-sized pest identification cards were created and distributed to tree inspectors and companies in the MDA Tree Care Registry, which is an on-line list of tree care companies that serves as a quick directory to use in case of plant pest emergencies such as quarantines.

Potato Cyst Nematode

Potato cyst nematode is a federally regulated pest with export implications. High populations of this pest can cause major yield losses in potatoes. Detected for the first time in the U.S. in 2006 in Idaho, all major potato-growing states have been asked to survey for this pest species; depending on the shipping destination, it may be required. The potato cyst nematode survey program officially began in winter 2007. Sampling and extraction equipment have been purchased. The laboratory in East Grand Forks was modified to enable the extraction process used in recovering cysts from the soil samples and dedicated staff was hired. The survey goal is to sample 100 percent of seed potato fields and 10 percent of commercial fields in each county in potato production acreage in 2006. Following protocols detailed by USDA Animal and Plant Health Inspection Service, almost 1,500 samples were collected. Most of the samples were collected as soil samples from the field, but some were collected as tare dirt samples from warehouses in early spring 2007.

In 2008, extractions and nematode pre-screenings will continue to be performed on the soil samples collected. Additional samples from fields that were planted to potatoes in 2006 will be collected along with an ongoing certification program.

Asian Soybean Rust

Asian soybean rust is a potentially devastating disease of soybean. It is caused by an invasive pathogen thought to have been introduced into the United States from South America in 2004 by Hurricane Ivan. Soybean rust has moved northward with each passing year. In 2007, it was detected in over 320 counties and 19 states. In Iowa, 14 counties were found to be positive for soybean rust in 2007, but the disease appeared so late in the season that treatment was not necessary and yield effects are not expected. Minnesota remains officially free of soybean rust; however, air and rain monitoring systems have detected pathogen spores in rain events. Minnesota maintains a robust soybean rust monitoring program of both stationary sentinel plots administered by the University of Minnesota and weekly soybean field checks by trained MDA survey staff. The MDA also works closely with the University in maintaining an early detection system that utilizes trained crop consultants, extension personnel and other professionals including MDA field staff. The MDA initiated the establishment of a soybean rust task force together with the University of Minnesota and the Soybean Growers Association. In addition, MDA has been a national leader in pursuing Environmental Protection Agency registrations for a number of fungicides needed to combat this serious pest should it arrive in Minnesota at a time when yield may be threatened.

Noxious Weeds / Invasive Plants

The purpose of the Noxious Weed Program is to limit the spread of some of the more problematic weed species, many of which are invasive, already established in the state. It 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 but landowners are not required to control them. 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.

Rulemaking in the late 1990’s established the Noxious Weed Potential Evaluation Committee (NWPEC) to develop a process for determining how and when a species should be considered noxious and be regulated. The criteria to be used in this process were invasiveness, difficulty of control, cost of control, any

tangible benefits provided by the species, and the potential injury that could be caused by the species if left unchecked. Over the three-year period beginning in 2000, the committee developed a unique system of assessment based loosely upon models already developed and in use by other states, the federal government, and other countries. A budget reduction in 2003 curtailed further efforts to test and use the process for its intended purpose. This weed risk assessment program was revived in 2007 to evaluate the current noxious weed list and provide a means to determine if weeds should be added or removed from the list. To date, seven weeds have been evaluated (Table 5).

TABLE 5

Plant species evaluated with Minnesota Plant Risk Assessment and Management Protocol

- *Cut-leaved teasel*
- *Dalmatian toad flax*
- *Leafy spurge*
- *Purple loosestrife*
- *Viper's bugloss (or Blueweed)*
- *Wild parsnip*
- *Yellow starthistle*

Aside from the Noxious Weed Program, a list of six weeds not known to be present in Minnesota or known only from limited areas of the state was developed. These are referred to as "early detection" weeds and they are all candidates for possible eradication or regulation of sale and distribution. A roadside weed survey targeting these weeds and others covered about two-thirds of the state and yielded approximately 3,100 samples. None of the early detection species were found in the survey. In addition, a GIS-based internet reporting tool for early detection weeds was developed. This tool allows cooperators to enter geographically referenced reports of weed sightings so the reports can be followed up for verification and further action if needed.

Several invasive weeds with limited distributions have been detected in Minnesota. The MDA is working to determine if eradication is feasible for any of these species. A British yellowhead infestation on the Capitol grounds is being eradicated by the grounds crew. The MDA is working with two other land owners for eradication of populations of this weed on their lands. A cut-leaved teasel infestation in Roseville was mapped to determine the extent of infestation and an eradication plan was developed in cooperation with the Ramsey County Agricultural Inspector and County Naturalist, and a copy was sent to the largest landowner. A delimiting survey for Grecian foxglove was conducted north of Stillwater in eastern Washington County. This is part of an MDA effort to conduct a cost/benefit analysis to determine feasibility of eradicating Grecian foxglove, a toxic weed, from the state. The MDA is working in cooperation with the St. Louis County Agricultural Inspector to eradicate two small patches of meadow knapweed in northeast St. Louis County.

Plans for 2008 include working with the Department of Transportation to coordinate roadside weed sampling protocols, so that data can be pooled and shared between agencies to give a better picture of problem areas and effectiveness of management efforts. Development of survey and sampling techniques for both detection and delimitation of new weeds will continue. In addition, reports of sightings of new weeds will continue to be followed up to verify identity and location of these plants and evaluate them for possible eradication efforts. The eradication of isolated infestations of new weeds such as cut-leaved teasel, British yellowhead, and meadow knapweed will continue. At least one table top response exercise and one field exercise for a mock detection will be performed on weeds threatening Minnesota.

Gypsy Moth

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 creep across the landscape, states must be prepared for the impact this insect will have on the natural resources, economies, and the citizens within their borders. Minnesota has been effective at detecting and eradicating small, start-up populations of this pest for 30 years.

The Slow the Spread 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 cooperative characteristics of the National Gypsy Moth Program leads to a pattern of collaboration between the MDA and several state, federal, tribal and local agencies.

The MDA remains the lead agency for gypsy moth prevention, detection, and rapid response as the gypsy moth moves into the eastern part of Minnesota. The Gypsy Moth Program Advisory Committee was formed to provide a forum to contributing partner agencies (Table 6). 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.

TABLE 6

Gypsy Moth Program Advisory Committee membership

- *Minnesota Department of Agriculture*
- *Minnesota Department of Natural Resources*
- *University of Minnesota*
- *USDA, Animal & Plant Health Inspection Service, Plant Protection and Quarantine*
- *USDA, Forest Service*

Steps were taken this year to distribute educational materials across the state to both businesses and private citizens. Informational brochures were redesigned and circulated throughout the state park network and travel information centers across Minnesota. Instructional DVDs were produced in 2006 to address the main concerns of transporting nursery stock from quarantined areas. These videos were distributed to Minnesota nursery license holders that engage in importing nursery stock. Videos included Spanish subtitles to reach out to the many nursery industry employees whose first language is Spanish and who are most likely to handle the stock and notice unusual pest problems.

Gypsy moth prevention through regulatory work was achieved through compliance agreements between federal and state departments of agriculture and the mills and nurseries that are involved in importing regulated articles from the gypsy moth quarantined area. All regulatory sites are surveyed each summer by the trapping program. Regulations directed by the USDA Animal and Plant Health Inspection Service are receiving a closer examination by program authorities and should provide more continuity and cooperation between states as they join forces on prevention and outreach, not just detection.

In 2007, staff deployed 21,599 traps. Moth numbers were the highest ever recorded in Minnesota, especially in Lake and Cook counties where over one-third of the 3,608 moths were caught. Moth numbers were much higher in the southeast part of the state where 3 counties (Houston, Winona, and Wabasha), accounted for 249 moths (7 percent of the statewide total). In recent years, moth catches have been extremely low and the increase may be attributed to increasing population pressure from the east. The MDA will be working closely with the land stewards within these areas to align management strategies with the increased pest pressure. Most of these isolated detections will be further delimited and treatments will be proposed for Lake and Cook counties in 2008. Funding for 2008 through Slow the Spread and the USDA Animal and Plant Health Inspection Service for survey and delimits have yet to be approved, but slightly lower amounts than in 2007 are expected.

Rapid responses statewide are in the form of delimiting surveys and treatment. Responses to the gypsy moth populations are formulated based on trap catch data and available funding through the Slow the Spread program and USDA Animal and Plant Health Inspection Service. Rapid response management options will be considered with the assistance of state and federal partner agencies. The MDA has proposed over 78,000 acres be treated in 2008 based on 2007 moth catches. Federal funding for the national Slow the Spread program has been cut by 40 percent in recent years.

Risk of Firewood Movement

Firewood is recognized as an important pathway for the movement of forest pests. The Interagency Firewood Group (Table 7), convened by the MDA, has met regularly through this past year, with many accomplishments. As part of the group's outreach and education about the risks of moving infested firewood, thousands of letters, bookmarks and posters have been distributed by the MDA. The message to buy and burn firewood locally has been on billboards, television, and radio, and presentations were given at numerous meetings. A variety of audiences were targeted around the state, including campground owners, firewood dealers, big box stores, Minnesota Forest Resources Council, loggers and truckers, and recreationists as well as the general public. The MDA has been met with strong support for the need to change the behavior of Minnesotans regarding firewood movement.

TABLE 7

Interagency Firewood Group Membership

- *Minnesota Department of Agriculture*
- *Minnesota Department of Natural Resources*
- *University of Minnesota*
- *USDA, Animal & Plant Health Inspection Service, Plant Protection and Quarantine*
- *USDA, Forest Service*

Results of a 2007 survey of firewood dealers revealed the opinion that firewood from out of state posed the greatest risk and should be regulated, and this opinion was correct in light of the documented spread of emerald ash borer and other exotic wood borers through firewood. To respond to this concern, the MDA and the Department of Commerce, Division of Weights & Measures collaborated to propose a change in firewood labeling laws. The 2007 Minnesota Legislature made it effective August 1, 2007, that firewood sold across state boundaries or more than 100 miles from its origin has to be labeled with the county and state from which the wood was harvested, therefore, making it easier to identify where the firewood was grown. The 2007 Legislature also backed our partner agency, the Department of Natural Resources, in establishing restrictions on firewood use on state lands. The Superior and Chippewa National Forests have followed suite.

The MDA conducts inspections of firewood retailers in order to determine the origin of what is being sold and to provide information on the role of firewood in the spread of invasive tree pests. Well over 100 inspections have been conducted to date, including small independently owned businesses, convenience stores and, most recently, at big box stores. Firewood distributors and vendors have been very helpful and mostly supportive of efforts to protect Minnesota's trees.

For 2008, the Interagency Firewood Group will continue to meet in order to coordinate objectives and activities. Lessons learned in states to our east highlight the need for continued outreach. Inspections and work with the MDA Marketing Division and local firewood dealers to promote Minnesota Grown Firewood will continue.

Plant Pest Survey

Fields of corn, soybean, small grains, alfalfa and sunflower were surveyed for numerous pests. Pests targeted in the survey include native and invasive insects, pathogens and weeds. Examples of targeted invasive pests can be found in Table 8. During 2007, 2,607 fields were surveyed. As part of this survey effort, two soybean pathogen surveys were conducted in collaboration with the Plant Pathology Department at the University of Minnesota, with 329 soybean fields surveyed. Data from these various surveys were used to publish weekly reports on crop pest conditions throughout Minnesota. Twelve weekly reports were published in 2007. In addition, Plant Pest Survey Staff supported the Export Certification Program by inspecting corn and soybean fields for pests of export concern.

TABLE 8

Targeted invasive pests and associated crops surveyed 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*
Soybean cyst nematode	*Soybean*

Returning field surveyors will continue to monitor invasive and native agricultural pests during the 2008 growing season. Field surveyors will receive additional training on new and emerging plant pests, and field staff may be recruited to respond to reports of new or emerging pests in greater Minnesota.

Cooperative Agricultural Pest Survey

The Cooperative Agricultural Pest Survey Program is funded by the USDA Animal and Plant Health Inspection Service. Surveys are selected based on national target pest lists and concerns of the Minnesota Cooperative Agricultural Pest Survey Committee (Table 9). The primary survey conducted under this program was for exotic bark beetles and wood wasps. Bark beetles rank among the most destructive forest pests, and the European wood wasp has caused up to 80 percent mortality of pine trees in other countries it has invaded. In 2007, trapping was conducted at 27 sites near the Twin Cities metropolitan area, St. Cloud and Duluth with a total of 133 traps. The traps were checked every two weeks from April through October yielding approximately 1,575 samples. Survey samples were sorted and identified from October through December. In addition to trapping, the MDA established two trap trees for the European wood wasp at two locations (four trap trees total) near a facility that imports untreated pine poles from areas in New York that are infested with the European wood wasp. The trap trees will be felled in spring of 2008, with some bolts dissected and others brought to the laboratory for rearing.

TABLE 9

Minnesota Cooperative Agricultural Pest Survey Committee membership

- *Minnesota Department of Agriculture*
- *Minnesota Department of Natural Resources*
- *University of Minnesota*
- *USDA, Animal & Plant Health Inspection Service, Plant Protection and Quarantine*
- *USDA, Forest Service*

Additional surveys were conducted under the Cooperative Agricultural Pest Survey Program in 2007 (Table 10). None of the targeted pests were detected, except for small hive beetle and soybean cyst nematode, which were both already known to occur in the state. In particular, the fact that the MDA has surveyed for and not detected Karnal bunt, a devastating wheat disease, for over ten years has allowed Minnesota to continue exporting this commodity. For 2008, federal funding through the Cooperative Agricultural Pest Survey Program was approved for exotic bark beetles, European wood wasp and Karnal bunt. If federal funding is approved, surveys for swede midge and light brown apple moth will be expanded (see Additional Surveys section for 2007 activities).

TABLE 10

Target pests for 2007 Cooperative Agricultural Pest Survey Program

Pest	Associated commodity
Exotic bark beetles	*Pine, Spruce, etc.*
European wood wasp	*Pine*
Karnal bunt	*Wheat*
Soybean rust	*Soybean*
Soybean cyst nematode	*Soybean*
Small hive beetle	*Honey bees*
Asian longhorned beetle	*Maple, birch, poplar, willow, etc.*
Sudden oak death	*Oak*

Commodity 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 quarantine(s). 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 11. In 2007, inspections were conducted at nearly 700 nursery growers and dealers in Minnesota. Inspectors did not find any targeted invasive pests in 2007.

TABLE 11

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

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

Fruit and vegetable

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 and symptoms 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, including agricultural seed, lawn and garden seed and wildlife forage seed mixes, in the state. Noxious weeds are classified as either prohibited or restricted (Table 12). 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 12

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	*Wild mustard*
Hemp	*Quackgrass*
Leafy spurge	*Wild radish*
Perennial peppergrass	*Giant foxtail*
Russian knapweed	*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. By assuring that our commodities are free from pests that could become invasive in another country, the MDA is able to facilitate trade.

Additional Surveys

Light Brown Apple Moth

Light brown apple moth is an invasive pest that feeds on over 250 different species of plants, including alfalfa, apple, blackberry, blueberry, broad bean, broccoli, cabbage, ferns, fir, geranium, grape, oak, peach, pear, pine, poplar, potato, rose, spruce, strawberry, walnut, and willow. Traps were deployed at 17 locations, including nurseries, apple orchards and urban woodlands, in Minnesota (see below for additional details about apple orchards). To date, light brown apple moth has not been detected in the state. If federal funding becomes available, survey efforts will be expanded for 2008.

Swede Midge

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 traps at four locations in Minnesota. One trap was placed in a cabbage field in Fillmore County, one in a cabbage field in Carlton County (northeast MN), two in cabbage fields in Dakota County, and one in a canola field in northwest Minnesota. To date, swede midge has not been detected in Minnesota. If federal funding becomes available, survey efforts will be expanded for 2008.

Integrated Pest Management (IPM)

The MDA Integrated Pest Management (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. The MDA surveyed for four invasive and seven native insect pests in apple orchards in the primary apple growing regions of Minnesota. This survey included the light brown apple moth, a pest of apple trees and numerous other plants, which was recently detected in California and is now under quarantine.

Weed IPM

MDA staff helps landowners and land managers develop practical IPM strategies for fighting invasive plant species in Minnesota. In 2007, biological control programs were continued for leafy spurge and spotted knapweed. These programs have been ongoing for over a decade in Minnesota. Additionally, the MDA provides technical resources for the development of mapping strategies for Cooperative Weed Management Areas in Becker and Clay counties. 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, mass rearing efforts have begun for a root-feeding biological control agent of spotted knapweed.

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, and 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 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 Biosaftety 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 will begin research on Asian soybean rust, sudden oak death and stem rust in 2008.

Laboratory Improvements

The newly expanded laboratory capabilities now are enabling the MDA to meet the increasing requirements for reliable data concerning the absence of pests or pathogens in our state's commodties. In 2007, the laboratory ran samples related to export certification, nursery survey and licensing, product imports, and sudden oak pathogen. The laboratory also aided in survey work for early detection of certain invasive species. A major goal for 2008 will be to define workflow from sample collection to analysis, and begin utilizing the laboratory information management system database.

Pest Risk Assessment

With numerous pests threatening to invade Minnesota, a tool was needed to prioritize these pests so that limited resources could be focused on those with the greatest likelihood of invading and causing problems. The MDA, in collaboration with the USDA Forest Service, developed a semi-quantitative pest risk assessment procedure that indicates the relative probability of pests invading and causing harm in Minnesota. Four risk assessments have been completed (Table 13), and one is in progress for the potato cyst nematode.

TABLE 13

MDA Regional Pest Risk Assessments

Pest	Score
Emerald ash borer	*170*
European wood wasp	*121*
Swede midge	*121*
Siberian moth	*63*
Potato cyst nematode	*in progress*

The MDA has started to shift how it addresses the arrival of new invasive species. Rather than focusing on how individual pests could enter the state, a more systems-based approach is being used to address pathways through which numerous pests could enter the state. A pathway that has received much attention is firewood movement (as described in the firewood section). Based on discussions from an interagency meeting, a risk assessment procedure is being developed to evaluate the risk of various other forest products acting as pathways for pest movement.

Permit Applications and Inspections

Permits are required for individuals or businesses to import plant pests (e.g., plant feeding insects, mites, snails, slugs, and plant pathogenic bacteria, viruses, fungi), biological control organisms of plant pests and weeds, bees, parasitic plants, federally listed noxious weeds and soil into Minnesota. As part of the federal permitting process, the MDA reviews the permit applications. If the permit conditions outlined for handling and use of the organism ensure minimal economic and/or environmental risk, MDA concurs to allow the organisms to be moved into Minnesota. However, if the MDA has concerns about the organism or specific permit conditions, recommendations are made to decrease the risk of economic and/or environmental impacts. Since January 2007, over 90 federal permits were reviewed.

In addition, the MDA conducts regulatory inspections of businesses and other entities intentionally bringing non-native organisms into Minnesota. Regulatory inspections are performed for situations where the public submitted reports of potential invasive pests.