

Report on the Status of Invasive Pests Threatening Fruit and Vegetable Production in Minnesota

Plant Protection Division, Pest Detection and Response Unit
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Spotted wing drosophila and basil downy mildew are two invasive pests that have recently become problems in Minnesota. The brown marmorated stink bug has also invaded Minnesota and is considered a significant threat - however, it is not yet abundant enough to have caused problems for growers. Along with these new pests that have become or are becoming familiar to people, there is a lengthy list of other organisms that could also cause problems for fruit and vegetable production in Minnesota.

New Pest Survey

The Minnesota Department of Agriculture (MDA) works with partners such as the USDA and the University of Minnesota to identify what organisms pose the greatest risk to Minnesota and to implement monitoring programs that provide the best opportunity to intercept these exotic pests.

Identifying the threats

In 2014, the MDA surveyed for 13 pathogens and 10 insects that could impact fruit and vegetable production in Minnesota (see Table 1 for specific organisms). This work was funded by the USDA through the 2014 Farm Bill. Particular species were chosen for survey based on an assessment of:

- The likelihood of a pest reaching Minnesota in the near future (due to proximity in other areas or evidence of a pathway into Minnesota)
- The prevalence and importance of potential hosts in Minnesota.
- Climactic suitability for over-winter survival.

Methods

To implement the survey, we worked with 49 community gardens and 17 community supported agriculture (CSA) farms in the greater Twin Cities, Duluth, St Cloud and Rochester areas (18 counties in total – see map Figure 1). The survey focused in and around urban areas because we predict this is where new pests will most likely be introduced and first become established. Invasive species affecting fruits and vegetables are most likely to be moved in seed, transplants, produce, cut flowers, nursery stock or other plants or plant parts. Since these are items moved by people, it follows that the greater the population of an area, the greater the movement of materials and the greater the risk of introducing an invasive.

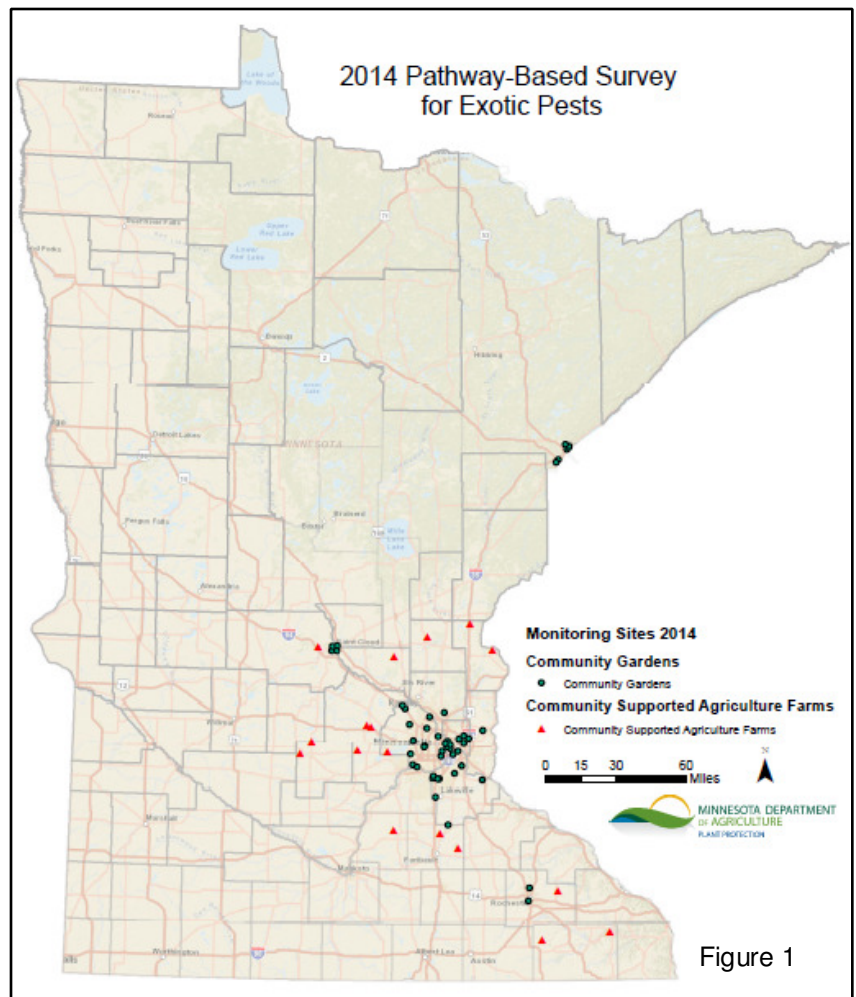


Figure 1

Pheromone traps and visual inspections were used to monitor for insect species, insect life stages, and host damage. Plants were also inspected for symptoms of plant pathogens and tissue samples were removed from symptomatic plants for diagnostic lab tests. A total of 324 traps were monitored for six different insect species. Suspect insect samples were submitted to a USDA expert for final identification. At the time of publication of this report, the final determination for two insects is not yet available. Table 1 shows what insects were monitored.

Results

A total of 51 plant samples were collected as symptomatic for nine different plant pathogens. Of those, the presence of only one target pathogen was confirmed. Basil downy mildew (*Peronospora belbahrii*) was confirmed in 22 samples from six counties including Anoka, Dakota, Hennepin, Le Sueur, Ramsey and Rice. Basil downy mildew had previously been confirmed in Ramsey County in 2012 and Anoka and Hennepin Counties in 2013. 2014 was the first year that basil downy mildew was confirmed in Dakota, Le Sueur and Rice Counties. Basil downy mildew does not overwinter outdoors in Minnesota and within-season infections are likely initiated through import of infected seeds or transplants before being spread more widely through wind dissemination of spores.

Work in 2015

In early 2015, the MDA will be reevaluating what organisms pose the greatest threat to enter Minnesota. As new information becomes available, imminent risk from some organisms becomes more apparent. For example, the spotted lanternfly (*Lycorma delicatula*) was discovered in Pennsylvania in September 2014 and poses a threat to fruit and other trees in North America. The spotted lanternfly is not known to be outside of a small area in Pennsylvania at this point, but with its distinctive appearance it is worth watching for. A *Pest Alert* has been developed by USDA and can be viewed here: www.aphis.usda.gov/publications/plant_health/2014/alert_spotted_lanternfly.pdf

Another example is cucumber green mottle mosaic virus. This pathogen was first found in California in 2013 and again in 2014 in a few additional locations. California is continuing eradication efforts, but, considering these recent finds, it is a pest that Minnesotans should also be watching for. More information about this pathogen can be found here: www.harrismoran.com/products/cucumber/pdf/CGMMVBrochure.pdf

Both spotted lanternfly and cucumber green mottle mosaic virus are concerns, but are unlikely to have significant impacts on fruits and vegetables in Minnesota in 2015. Conversely, basil downy mildew was so ubiquitous during 2014 that individuals growing basil in Minnesota should expect that it may be a problem in 2015. Growers can reduce the likelihood of problems by obtaining disease-free seed or plants from reputable sources and inspecting them for indications of disease. Obtaining plants or plant material from known sources and inspecting for signs of insects or disease are helpful first defenses in preventing invasive pests from entering and becoming established in Minnesota.

The MDA has submitted a proposal to the USDA to repeat this pathway survey in 2015 with an updated list of target pests. If the proposal is successful and resources allow, we will broaden the areas we are monitoring to include other urban centers in the state.

If unfamiliar insects or symptoms appear on plants there are resources available to help identify the problem:

- University of Minnesota – What’s Wrong With My Plant - www.extension.umn.edu/garden/diagnose/plant/
- Minnesota Department of Agriculture – Arrest the Pest – www.mda.state.mn.us/arrestthepest

Table 1. Insects and pathogens surveyed for at small farms and community gardens in and around urban areas during 2014.

Common name	Scientific Name	Survey Method	Trap or visual checks	Suspect Samples Collected	Positive Confirmations
Golden twin spot moth	<i>Chrysodeixis chalcites</i>	Trap	265	20	0
Swede midge	<i>Contarinia nasturtii</i>	Trap	259	10	0
Brown marmorated stink bug	<i>Halyomorpha halys</i>	Trap	125	0	0
Old world bollworm	<i>Helicoverpa armigera</i>	Trap	218	95	0
Tomato fruit borer	<i>Neoleucinodes elegantalis</i>	Trap	260	16	0
Egyptian cottonworm	<i>Spodoptera littoralis</i>	Trap	160	15	0
Bacterial wilt and canker of tomato	<i>Clavibacter michiganensis michiganensis</i>	Visual	124	2	0
Goss's wilt and blight of corn	<i>Clavibacter michiganensis nebraskensis</i>	Visual	124	2	0

Bean bacterial wilt / leaf spot / canker	<i>Curtobacterium flaccumfaciens</i>	Visual	124	4	0
Cucumber green mottle mosaic virus	<i>CGMMV</i>	Visual	124	4	0
Cucurbit beetle	<i>Diabrotica speciosa</i>	Visual	124	0	0
Stem and bulb nematode	<i>Ditylenchus dipsaci</i>	Visual	124	0	0
Fruit piercing moth	<i>Eudocima fullonia</i>	Visual	124	0	0
Brown marmorated stink bug	<i>Halyomorpha halys</i>	Visual	124	0	0
Late wilt of corn	<i>Harpophora maydis</i>	Visual	124	2	0
Wheat bug	<i>Nysius huttoni</i>	Visual	124	0	0
Downy mildew of basil	<i>Peronospora belbahrii</i>	Visual	124	23	22
Downy mildew of corn	<i>Peronosclerospora maydis</i>	Visual	124	2	0
Late blight of tomato / potato	<i>Phytophthora infestans</i>	Visual	124	6	0
Large white butterfly	<i>Pieris brassicae</i>	Visual	124	0	0
Downy mildew of cucurbits	<i>Pseudoperonospora cubensis</i>	Visual	124	0	0
Southern bacterial wilt	<i>Ralstonia solanacearum</i> Race 1 Race 3 Biovar2	Visual	124	0	0
Brown stripe downy mildew of corn	<i>Sclerophthora rayissiae var zeae</i>	Visual	124	2	0

Brown Marmorated Stink Bug

The brown marmorated stink bug (BMSB) was first identified in Minnesota in 2010 and since then has been found throughout the Twin Cities metropolitan area as well as in St Louis, Winona and Rice Counties (see map – Figure 2). BMSB has caused serious problems for fruit and vegetable growers in the mid-Atlantic states, where it is believed to have been present since the mid-1990's. The concern is that as BMSB builds in abundance and distribution it will cause economic damage in orchards, vegetables and field crops as well (BMSB feeds on fruits, leaves, stems and seeds causing dead spots on fruits and leaves and deformed fruit). If we assume that a similar timeline will be followed in Minnesota as in the mid-Atlantic, we can expect BMSB to become a significant pest in Minnesota within the next five years. However, since there are many differences between Minnesota and the mid-Atlantic, this may or may not be the case.

The MDA is working to track the distribution and abundance of BMSB across Minnesota so problem areas can be anticipated before they develop. The MDA is also working with the University of Minnesota to support research on the biology of BMSB in Minnesota as well as the potential for natural enemies to survive and thrive in Minnesota.

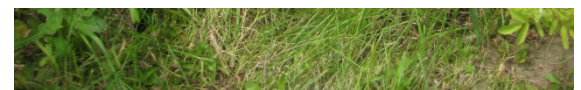
Work in 2014

BMSB was one of the organisms monitored with pheromone traps in community gardens and CSA farms (66 sites). Funding from the Environmental and Natural Resources Trust Fund allowed the MDA to place pheromone traps at 100 additional sites throughout the state in apple orchards and/or vegetable farms. A total of 166 sites were monitored for BMSB in Minnesota during 2014 (see map – Figure 2).



Brown marmorated stink bug trap

BMSB was only found at one site, at a residence in the City of Wyoming – Chisago County. The property owners reported BMSB in Fall 2013 and the MDA was able to confirm it as BMSB. In the Fall of 2014, the property owners reported BMSB again and the MDA placed traps at the property as a check of their effectiveness. One confirmed BMSB specimen was captured in a trap on the property.



BMSB has been documented throughout the Twin Cities area since it was first discovered here in 2010. It was somewhat surprising, therefore, that this first year of trapping did not find more BMSB in 2014.

Prior to 2014, we relied on citizen reports of BMSB to help us determine its distribution in the state. Confirmed finds from citizen reports have remained fairly consistent from 2010 through 2014:

- 2010 – BMSB confirmed at 4 sites
- 2011 – BMSB confirmed at 5 sites
- 2012 - BMSB confirmed at 3 sites
- 2013 – BMSB confirmed at 4 sites
- 2014 - BMSB confirmed at 4 sites

Work in 2015

Trap monitoring for BMSB is relatively new, so it may take some time to interpret the meaning of trap captures or lack of captures regarding the abundance of BMSB in an area. In 2015, the MDA will continue to monitor for BMSB across the state with support from the Environmental and Natural Resources Trust Fund and potentially the USDA. We are currently accessing protocols for constructing, baiting and placing BMSB traps to determine if any changes can be made to improve trap efficacy. The MDA will continue to follow up on citizen reports of BMSB to further help determine the distribution and abundance of this invasive insect.

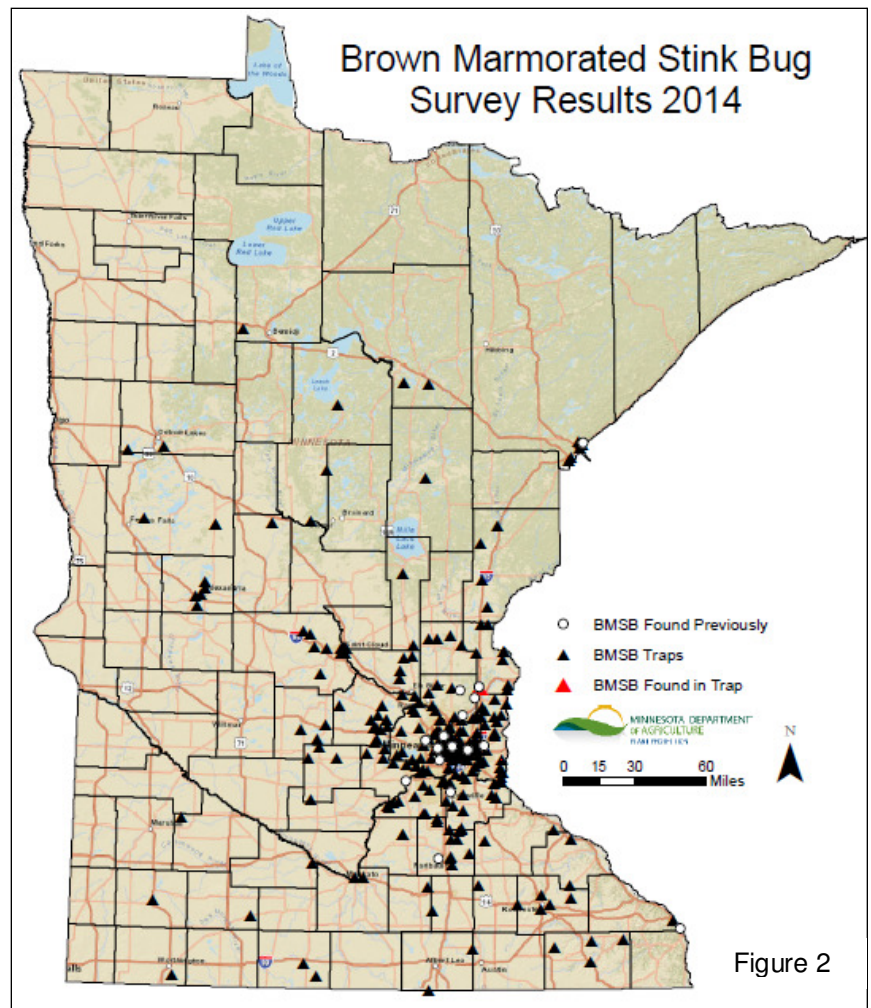


Figure 2

For more information or if you suspect you have seen a brown marmorated stink bug:

- www.mda.state.mn.us/arrestthepest

Spotted Wing Drosophila

The spotted wing drosophila (SWD) has had a big impact on berry growers throughout Minnesota since it was first discovered here in 2012 - SWD feeds on berries causing extensive fruit damage. Through 2014, SWD has been confirmed in 39 Minnesota counties covering a large portion of the state (map available here: <http://www.fruitedge.umn.edu/current-distribution-swd-minnesota/>).

Work in 2014

During 2014, the MDA responded to reports of SWD to help individuals confirm that SWD was in fact present. The MDA did not conduct any formal detection surveys for SWD in 2014 since SWD had already been found across most of the state during 2012 and 2013.

Work in 2015

Since SWD is known to already be present across the state, Minnesota growers with susceptible plants should plan to monitor their crops with the expectation that SWD will be a potential threat in 2015. The MDA and the University of Minnesota are initiating a project this year to aid grower monitoring efforts by providing alerts when SWD is detected in various parts of the state. Ideally, this would notify growers when monitoring efforts should be intensified and would serve as another source of information to use in interpreting monitoring results. The University of Minnesota will be researching impacts and management of SWD in Minnesota. This project is funded by the USDA Specialty Crop Block Grant to Minnesota.