



Environment and Natural Resources Trust Fund (ENRTF) M.L. 2014 Work Plan

Date of Report: January 31, 2014
Date of Next Status Update Report: November 15, 2014
Date of Work Plan Approval:
Project Completion Date: June 30, 2017
Does this submission include an amendment request? N

PROJECT TITLE: Brown Marmorated Stink Bug Monitoring and Biocontrol Evaluation (MDA - Activity 1)

Project Manager: Mark Abrahamson
Organization: Minnesota Department of Agriculture
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Location: Statewide - Minnesota

Total ENRTF Project Budget:	ENRTF Appropriation:	\$99,000
	Amount Spent:	\$0
	Balance:	\$99,000

Legal Citation: M.L. 2014, Chp.226, Sec. 2, Subd. 04f-2

Appropriation Language:

\$99,000 the second year is from the trust fund to the commissioner of agriculture and \$167,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to monitor for brown marmorated stink bugs to identify problem areas, target biocontrol efforts, and evaluate the suitability of candidate biological control agents for use in Minnesota. This appropriation is available until June 30, 2017, by which time the project must be completed and final products delivered.

I. PROJECT TITLE: Brown Marmorated Stink Bug Monitoring and Biocontrol Evaluation (MDA - Activity 1)

II. PROJECT STATEMENT:

Our project seeks to install a framework for monitoring brown marmorated stink bug (BMSB) (*Halyomorpha halys*) within Minnesota to identify developing problem areas and target implementation of biological control. We also propose to evaluate the suitability of biological control agents identified by USDA for use in Minnesota.

BMSB in Minnesota

BMSB was first discovered in Minnesota in 2010 (St. Paul) and is now in Ramsey, Washington, Anoka, Winona, Hennepin, Chisago, Carver, Dakota and St. Louis counties. BMSB is a generalist plant pest attacking 300+ species of plants in natural, agricultural and horticultural settings, with potential to feed on many native plant species in Minnesota. Due to unpleasant odor, large size and sheer numbers, BMSB is a nuisance home invader worse than Asian lady beetles or box elder bugs in the eastern U.S. As BMSB populations build in Minnesota, indirect impacts to environment and natural resources are likely to occur through increased pesticide use in homes, yards, agricultural fields and orchards to control this pest. For example, when Midwestern soybean was invaded by the soybean aphid (*Aphis glycines*), insecticide use increased 130-fold in that crop. In addition to soybean, BMSB attacks many other field, fruit and vegetable crops. Insecticide use in orchards in the Mid-Atlantic region has already increased fourfold due to BMSB. Direct impacts of BMSB to environment and natural resources are likely due to its broad host range including native plant species and potential for rapid population growth. A Federal risk assessment determined: "Heavy feeding pressure by BMSB could also damage or reduce native plant species and impact biodiversity throughout the United States." The same Federal document also states: "...it is reasonable to expect that BMSB could displace and directly compete with native stink bugs..."

Monitoring for BMSB – MDA Component

Based on experience with BMSB in other areas of the country, we expect BMSB to first become a household nuisance and then become a significant plant pest. We expect these adverse impacts to occur 5-10 years from initial discovery. It has been 3 years since discovery in Minnesota; therefore, it is imperative that a proactive response be implemented now. Monitoring for BMSB at the landscape level should help to predict where problem areas are developing; alerting stakeholders within the area and allowing targeted efforts at biological control to protect natural and agricultural resources. Research on a trap and lure for BMSB is reaching the point where this approach is feasible.

Biological control – UMN Component

Management of this pest in eastern states has relied primarily on insecticide use. Biological control has proven to be an environmentally sound and economical alternative in some systems. It is necessary to evaluate and identify appropriate biological control agents for use against BMSB in Minnesota before populations reach damaging levels. Federal researchers are evaluating 35 populations of 4 species of parasitic wasps (*Trissolcus* spp.) known to attack BMSB eggs in South Korea, Japan and China. This work is aimed to determine the potential efficacy and safety of these species as biological control agents for BMSB. The ability of the candidate biological control agents to survive winter conditions in northern states, such as Minnesota, remains undetermined and will be necessary for advancement to implementation. This project will examine the ability of the most promising candidate biological control agents to survive winter and use modeling techniques to determine the suitability of Minnesota for establishment.

III. PROJECT STATUS UPDATES:

Project Status as of November 15, 2014:

Project Status as of May 15, 2015:

Project Status as of November 15, 2015:

Project Status as of May 15, 2016:

Project Status as of November 15, 2016:

Overall Project Outcomes and Results:

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Monitoring for Brown Marmorated Stink Bug (BMSB)

Description:

Minnesota Department of Agriculture will engage First Detectors, citizen scientists, producers and other volunteers to monitor for BMSB with a standardized process across Minnesota. Monitoring sites will be identified based on estimates of BMSB spread within the state.

- MDA will recruit sites for monitoring based on perceived risk from BMSB – i.e., we will use locations with positive BMSB finds as well as areas of favorable habitat for BMSB to identify the best sites for monitoring in each year.
- We will use the most efficacious and economical means of trapping. There is currently a trap and lure available for BMSB. If new trap/lure designs become available we will use the method that is most efficient.
- Initially MDA will set and maintain traps, by the end of this project we hope to have turned this function over to interested volunteers.
- MDA will visit monitoring sites during the field season to check traps, check on work by volunteers, verify new finds when needed or for additional sampling if justified. For instance, if BMSB is found in a new area MDA will likely conduct additional sampling through other methods such as sweep netting or beat sampling (beating or shaking vegetation over a ground cloth) to determine the level of activity in the area.
- MDA will use data collected from MDA monitoring and from volunteers at regular intervals to publish the results via an Internet-based map.
- For traps maintained by volunteers, trap samples which will be screened by MDA for verification purposes – i.e., volunteers would report results during the growing season and the samples the reports were based on would be periodically screened by MDA to assure reporting was accurate.

Summary Budget Information for Activity 1:

ENRTF Budget: \$ 99,000
Amount Spent: \$ 0
Balance: \$99,000

Activity Completion Date: June 30, 2017

Outcome	Completion Date	Budget
1. Order supplies and implement first season of monitoring	October, 2014	\$ 16,306
2. Field season review, verify trapping results, web mapping maintenance	January, 2015 - 2017	\$ 21,223
3. Increase monitoring network and equip for field season	June, 2015 and 2016	\$ 32,429
4. Maintain monitoring network through field season	October, 2015 and 2016	\$ 29,042
9. Submit final report	June, 2017	\$ 0

Activity Status as of November 15, 2014:

Activity Status as of May 15, 2015:

Activity Status as of November 15, 2015:

Activity Status as of May 15, 2016:

Activity Status as of November 15, 2016:

Final Report Summary:

ACTIVITY 2: Studies on overwintering potential of Brown Marmorated Stink Bug (BMSB) control agents in Minnesota

Description:

This activity will be carried out by UMN. See UMN work plan for project description and budget.

V. DISSEMINATION:

Description:

The primary audience for this work will be producers and hobby growers of fruits and vegetables. Monitoring information for BMSB will help to anticipate problem areas before they develop. In addition to commercial and hobby growers, others will also benefit from this information due to the nuisance behavior of this insect to invade structures in the fall. Identifying areas where this may become problematic and providing that information in advance of the problem may help to avoid negative reactions among residents of these areas. Information will be disseminated to these audiences through direct email communication, web site updates, social media and news releases. The updates on the monitoring network and biological control status will be reported at relevant meetings and conferences throughout the year. We anticipate that this work will also result in an article in a scientific journal as well as presentations at national scientific meetings. However, ENRTF funds will not be used for travel to national meetings.

Status as of November 15, 2014:

Status as of May 15, 2015:

Status as of November 15, 2015:

Status as of May 15, 2016:

Status as of November 15, 2016:

Final Report Summary:

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget Overview:

Minnesota Department of Agriculture

Budget Category	\$ Amount	Explanation
Personnel:	\$ 71,122	1 Survey coordinator (0.52 FTE): Salary (\$56,890 = \$17.40/hr x 3,270 hrs) + Fringe (\$14,225 = 25% of salary)
Travel	\$ 17,250	- Vehicle rental and fuel (we will use the least expensive method of travel which will be either a state vehicle or a rented vehicle) approx. \$5,250 per year * 3 years** - Meals and lodging as needed for MDA Coordinator (estimated 15 days of travel per year) approx. \$500 per year * 3 years
Equipment/Tools/Supplies:	\$ 10,628	Supplies for conducting survey and sampling including traps, lures, bags, vials, and other supplies needed for maintaining monitoring network approx. \$3,500 per year * 3 years
TOTAL ENRTF BUDGET:	\$ 99,000	

**We generally have 3 vehicle options for travel needs:

- reimburse mileage costs for personal vehicle use
- state vehicle lease
- Enterprise vehicle rental

Reimbursing personal mileage is only cost effective when daily miles are relatively low (< 65 miles per day). State leased vehicles can be more cost effective at this point, but only if the vehicle can be leased for a sufficiently long time. If a state vehicle lease is not an option, the last option is an Enterprise rental vehicle. At 87 miles per day, an Enterprise rental is more cost effective than reimbursing personal miles. For this project we estimate 150 miles per day for average daily mileage based on past experience. We will use the most economical means of travel available to achieve the goals of this project.

Explanation of Use of Classified Staff: N.A.

Explanation of Capital Expenditures Greater Than \$5,000: N.A.

Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation:

MDA Survey Coordinator: 1.56 FTE over 3 years

Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation: N.A.

B. Other Funds:

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
Non-state			
	\$	\$	
State			
	\$20,000	\$	Project oversight
TOTAL OTHER FUNDS:	\$20,000	\$	

VII. PROJECT STRATEGY:

A. Project Partners:

Receiving funds: Mark Abrahamson with MDA will lead the monitoring work (**receiving \$99,000**). Dr. Robert Koch with U of MN will lead the work to evaluate potential biological control agents for suitability in Minnesota (**receiving \$167,000**). Both organizations will provide in-kind equipment, facilities, and GIS/technical support.

Not receiving funds: For monitoring, we will draw volunteers from the various groups such as Master Gardeners, First Detectors and Producers. For evaluation of the biological control agents, Dr. Robert Venette with the USDA Forest Service will provide technical guidance on overwintering biology and cold hardiness. Dr. Kim Hoelmer of the USDA ARS will provide biological control agents for this work.

B. Project Impact and Long-term Strategy:

This project will put in place a monitoring network for BMSB that will likely prove useful for years to come and will be a first step towards implementation of biological control for BMSB, which is a critical need for proactively dealing with this pest in an economically and environmentally sustainable manner. This work will aid in selection of biological control agents for use in Minnesota. If one or more biological control agents show a high likelihood for survival in Minnesota, the next step will be work on implementation of a control program after approval for release has been granted.

C. Spending History:

Funding Source	M.L. 2008 or FY09	M.L. 2009 or FY10	M.L. 2010 or FY11	M.L. 2011 or FY12-13	M.L. 2013 or FY14
USDA Specialty Crop Block Grant				\$43,000	\$57,000

State General Funds				\$5,000	

VIII. ACQUISITION/RESTORATION LIST: N.A.

IX. VISUAL ELEMENT or MAP(S):

See attached graphic.

X. ACQUISITION/RESTORATION REQUIREMENTS WORKSHEET:

N.A.

XI. RESEARCH ADDENDUM:

N.A.

XII. REPORTING REQUIREMENTS:

Periodic work plan status update reports will be submitted no later than 11/15/2014, 5/15/2015, 11/15/2015, 5/15/2016 and 11/15/2016. A final report and associated products will be submitted between June 30 and August 15, 2017.

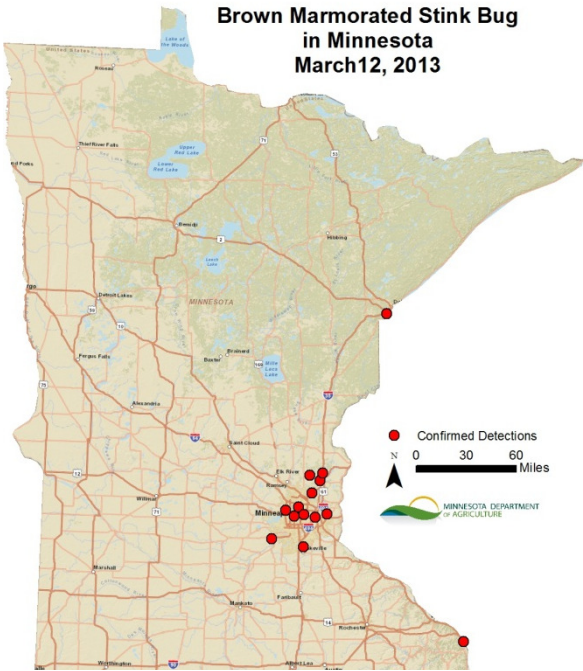


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M.L. 2014 Project Budget								
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Project Manager: Mark Abrahamson								
Organization: Minnesota Department of Agriculture								
M.L. 2014 ENRTF Appropriation: \$99,000								
Project Length and Completion Date: 3 year project, to be completed June 30, 2017								
Date of Report: January 15, 2014								

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Activity 1 Balance	Activity 2 Budget	Amount Spent	Activity 2 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	Establish and maintain a monitoring network for BMSB		Evaluate cold hardiness of potential biocontrol agents.					
Personnel (Wages and Benefits) 1 Survey coordinator (0.52 FTE): Salary (\$56,890 = \$17.40/hr x 3,270 hrs) + Fringe (\$14,225 = 25% of salary)	\$71,122		\$71,122				\$71,122	\$71,122
Equipment/Tools/Supplies Supplies for conducting survey and sampling including traps, lures, bags, vials, and other supplies needed for maintaining monitoring network approx. \$3,500 per year * 3 years	\$10,628		\$10,628				\$10,628	\$10,628
Travel expenses in Minnesota - Vehicle rental and fuel (we will use the least expensive method of travel which will be either a state vehicle or a rented vehicle) approx. \$5,250 per year * 3 years** - Meals and lodging as needed for MDA Coordinator (estimated 15 days of travel per year) approx. \$500 per year * 3 years	\$17,250		\$17,250				\$17,250	\$17,250
COLUMN TOTAL	\$99,000		\$99,000				\$99,000	\$99,000

Brown Marmorated Stink Bug Monitoring and Biocontrol Evaluation

STATUS IN MINNESOTA



Current known distribution of BMSB in Minnesota.

POTENTIAL IMPACTS

Federal risk assessment determined: *“Heavy feeding pressure by BMSB could also damage or reduce native plant species and impact biodiversity throughout the United States.”*



Fall congregation of BMSB on a building (not in MN), photo by Leske, 2010.

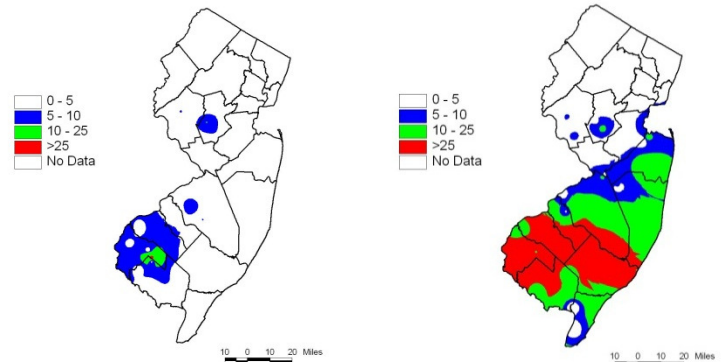
MONITORING NETWORK



Trap used for monitoring BMSB populations.

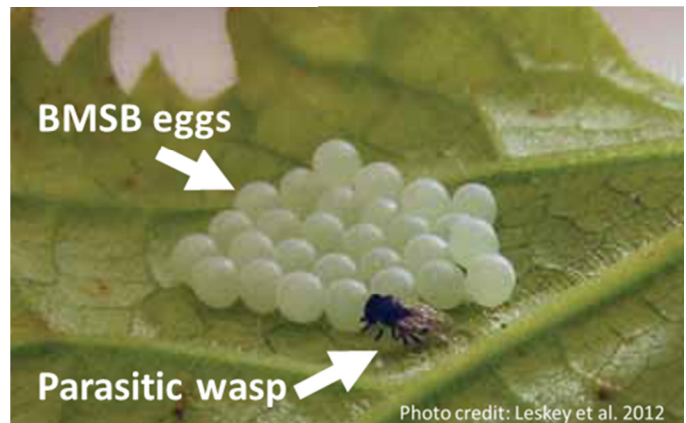
Average Nightly Distribution of Adult BMSB for week ending June 15, 2011

Average Nightly Distribution of Adult BMSB for week ending August 03, 2011



Results from BMSB monitoring network in New Jersey predicting problem area. Maps by Rutgers University.

BIOLOGICAL CONTROL



Potential biocontrol agent attacking BMSB eggs. Wasps are 1-2 mm long and cannot sting humans.