

**Environment and Natural Resources Trust Fund
2014 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 100-D

Brown Marmorated Stink Bug Monitoring and Biocontrol Evaluation

Category: D. Aquatic and Terrestrial Invasive Species

Total Project Budget: \$ 266,024

Proposed Project Time Period for the Funding Requested: 3 Years, July 2014 - June 2017

Summary:

We will monitor for brown marmorated stink bug to identify problem areas and target biocontrol efforts. We will evaluate the suitability of potential biological control agents for use in Minnesota.

Name: Mark Abrahamson

Sponsoring Organization: MN Department of Agriculture

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Web Address

Location

Region: Statewide

County Name: Statewide

City / Township:

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ Employment	_____ TOTAL _____%



PROJECT TITLE: Brown Marmorated Stink Bug Monitoring and Biocontrol Evaluation

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.
 - Impact to native flora: 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."
 - Impact to native fauna: 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

- 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

- 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.



II. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Monitoring of BMSB

Budget: \$99,000

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, train and equip volunteers to monitor for BMSB.
- Sites will be selected to optimize the value of the information collected to identify areas with developing BMSB problems.
- MDA will collect data from volunteers at regular intervals and publish the results via an Internet-based map.

Outcome	Completion Date
1. Volunteer BMSB monitoring network	May each year
2. Collect data at regular intervals and publish in online map	Sept each year

Activity 2: Studies on overwintering potential of BMSB control agents in Minnesota

Budget: \$167,024

- U of MN and the Forest Service will use laboratory methods (supercooling point, lower lethal temperature and lower lethal time) to measure the impact of cold temperatures on the physiology and survival of candidate biological control agents of BMSB.
- U of MN and the Forest Service will model the relationship between cold winter temperatures and survival of three candidate biological control agents of BMSB to determine likelihood of survival and establishment in Minnesota.

Outcome	Completion Date
1. Measurement of the response to cold temperatures by candidate biological control agents of BMSB	12/31/2016
2. Model for impact of winter temperatures on survival of candidate biological control agents of BMSB	06/30/2017

III. PROJECT STRATEGY

A. Project Team/Partners

Receiving funds: Mark Abrahamson with MDA will lead the monitoring work. Dr. Robert Koch with U of MN will lead the work to evaluate potential biological control agents for suitability in Minnesota. 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. Timeline Requirements

The project will run for three years from 07/01/2014 to 06/30/2017

C. Long-Term Strategy and Future Funding Needs

This project will put in place a monitoring network for BMSB that will likely prove useful for years to come. Moreover, this project 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.

2014 Detailed Project Budget

Project Title: Brown Marmorated Stink Bug Monitoring and Biological Control Evaluation

IV. TOTAL ENRTF REQUEST BUDGET 3 years

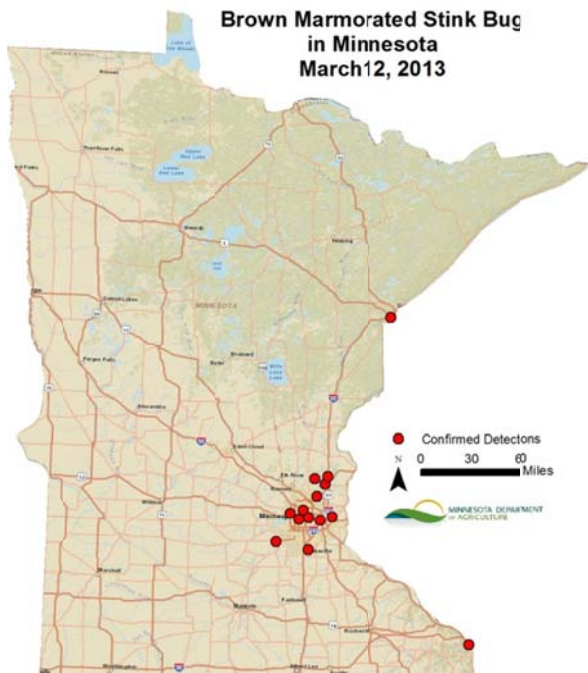
BUDGET ITEM	AMOUNT
Personnel:	\$ 237,124
MDA: 1 Survey Coordinator (0.5 FTE) = Salary (\$23,000) + Fringe (\$7,000) * 3 years	\$ 90,000
U of M: 1 Lab Technician (1.0 FTE) = Salary (\$35,130) + Fringe (\$49,041) * 3 years	\$ 147,124
Equipment/Tools/Supplies:	\$ 13,500
Traps and lures for monitoring network - 100 traps + lures = \$3,000 * 3 years	\$ 9,000
Cages & supplies for maintaining insect populations in lab: \$1,500/yr * 3 yrs	\$ 4,500
Additional Budget Items:	\$ 15,400
Fee for use of space in quarantine facility & growth chambers: \$400/mo * 3 years	\$ 14,400
Publication fees: 2 scientific articles * \$500 / article	\$ 1,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 266,024

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State \$ Being Applied to Project During Project Period: MDA and U of M currently have a grant from USDA to monitor for BMSB in soybeans and investigate impacts of BMSB to fruit and vegetables in Minnesota. This project will end in December 2014 - an estimated \$5,000 may be spent during the project period starting July 1, 2014.	\$ 5,000	Secured
Other State \$ Being Applied to Project During Project Period:	\$ -	
In-kind Services During Project Period: Lab equipment, computing/software and data management and oversight of monitoring network (\$21,000 for MDA). Unrecovered federally negotiated F&A (calculated at 52% MTDC) constitutes the U of MN cost share (\$86,852).	\$ 107,852	Secured
Remaining \$ from Current ENRTF Appropriation (if applicable):	\$ -	
Funding History: MDA and U of M currently have a grant from USDA (described above). By July 1, 2014 an estimated \$95,000 will have been spent.	\$ 95,000	

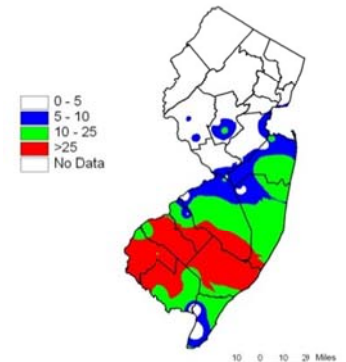
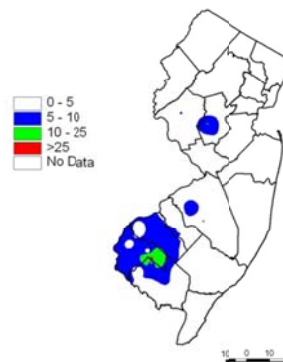
Brown Marmorated Stink Bug Monitoring and Biocontrol Evaluation

SOTA



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

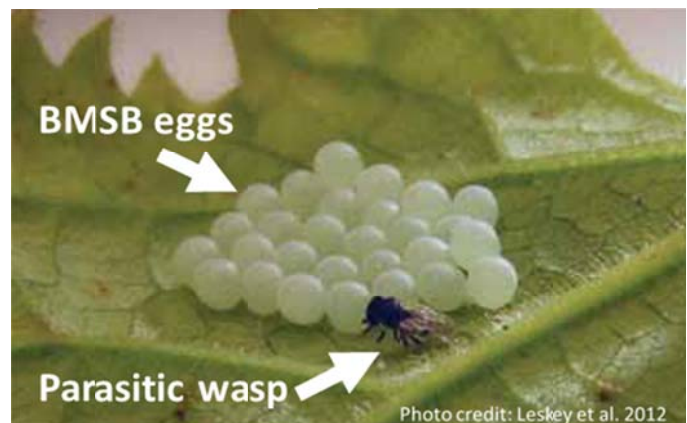
Average Nightly Distribution of Adult BMSB for week ending August 03, 2011



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



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Brown Marmorated Stink Bug Monitoring and Biocontrol Evaluation

Qualifications

Project Manager

Mark Abrahamson, M.S., Entomologist, Pest Detection and Response Unit, Plant Protection Division – Minnesota Department of Agriculture

Mark has been an entomologist at MDA since 1999 and has worked in the Pest Detection and Response Unit since 2005. Some job responsibilities pertinent to this project include:

- Monitoring the distribution and abundance of new and emerging plant pests in Minnesota
- Facilitating management efforts for new and emerging plant pests such as biological control

Robert Koch, Ph.D., Assistant Professor and Extension Entomologist, Department of Entomology, University of Minnesota. His work focuses on applied ecology and integrated pest management. Dr. Koch made the first detection of BMSB in Minnesota, and is involved with several projects related to this pest. He will lead the research to evaluate biocontrol agents for BMSB.

Abrahamson and Koch have collaborated on projects in the past including work on brown marmorated stink bug, spotted wing drosophila and other new and emerging plant pests in Minnesota.

Organization Description

The Minnesota Department of Agriculture's Plant Protection Division has primary responsibility for detection efforts related to emerald ash borer and other new terrestrial invasive plant pests. Minnesota Department of Agriculture is responsible for plant protection (Minnesota Statute 18G.01) and is the lead agency on brown marmorated stink bug in Minnesota.