Project Title: TRAPPING FOR BROWN MARMORATED STINK BUG

Project Director: George Hamilton, Rutgers – The State University of New Jersey

Co-PDs: None

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Summary

This project examined the use of mass trapping as a management tactic for the brown marmorated stink bug in an industrial park setting by 1) Evaluating tenant awareness and distress regarding *Halyomorpha halys* prior to mass trapping efforts, 2) Evaluating the use of mass trapping as a non-pesticidal management tactic against *Halyomorpha halys* in an industrial park setting, and 3) Evaluating tenant satisfaction with mass trapping as a management tool for *Halyomorpha halys*. Tenant awareness and distress was high prior to the initiation of the study due to the population levels of H. halys present in the buildings. The use of mass trapping as a means to reduce *H. halys* populations showed potential and an IPM tactic. This finding was supported by post-study comments made by tenants.

Problem, Background, and Justification

The brown marmorated stink bug, *Halyomorpha halys* (Stål), is an exotic stink bug (Heteroptera: Pentatomidae) that was introduced into the United States in the mid 1990's and spread throughout PA, NJ, DE, MD, and VA. In the United States, this invasive insect is just beginning to become an agricultural problem in eastern PA, western MD and northwestern NJ; however, throughout its current known northeastern range *H. halys* is a severe commercial property nuisance. In the fall, adults congregate on the sides of buildings, eventually entering attics, garages and other structures to overwinter. While this behavior creates a temporary nuisance, more permanent annoyances occur during the winter when outdoor temperatures rise resulting in increased activity by individuals in overwintering areas followed by invasions of indoor work areas.

In areas where *H. halys* populations exist, tenants are desperate to find ways to prevent it from entering buildings or removing them once they do. Current control measures include physical exclusion from residences using screening and caulking but are not 100% effective. Once inside, vacuuming and disposal of individuals once they enter work spaces; however, any disturbance of the bugs can create an unpleasant odor as collected insects release noxious smelling chemicals as a defensive mechanism. Another potential management tactic would be the use insecticides as either a knockdown spray inside buildings or to create chemical barriers on the outside of structures. Unfortunately, insecticides labeled to control stink bugs are currently unavailable. Finally, the use of biological control agents as a way to diminish or eliminate outdoor

populations, thereby preventing or reducing the number of insects entering structures is impractical and unavailable.

Due to the lack of chemical control options or effective non-chemical management strategies and the potential illegal use of insecticides as a last resort, the development of new management tools will enhance our ability to manage this pest in urban settings. Our project tested such a method, i.e. mass trapping of adult *H. halys* using traps baited with a synthetic aggregation attractant.

Objectives

For the reasons outlined above, we had the following objectives:

1) Evaluate tenant awareness and distress regarding *Halyomorpha halys* prior to mass trapping efforts,
2) Evaluate the use of mass trapping as a non-pesticidal management tactic against *Halyomorpha halys* in an industrial park setting, and
3) Evaluate tenant satisfaction with mass trapping as a management tool for *Halyomorpha halys*.

Approach and Procedures

Objective 1: Evaluate tenant awareness and distress regarding *Halyomorpha halys* prior to mass trapping efforts – We developed a questionnaire designed to measure the current knowledge of homeowners participating in the study about *H. halys*. It consisted of a series of questions about *H. halys*, tenant frustration with these insects, available control options, present tactics used by the site management company, the effectiveness of these tactics and their interest in trying a new management option. The survey was conducted using face to face meetings with participants, and together with its companion post-trial survey, was used to measure tenant opinions regarding the effectiveness of the mass trapping program.

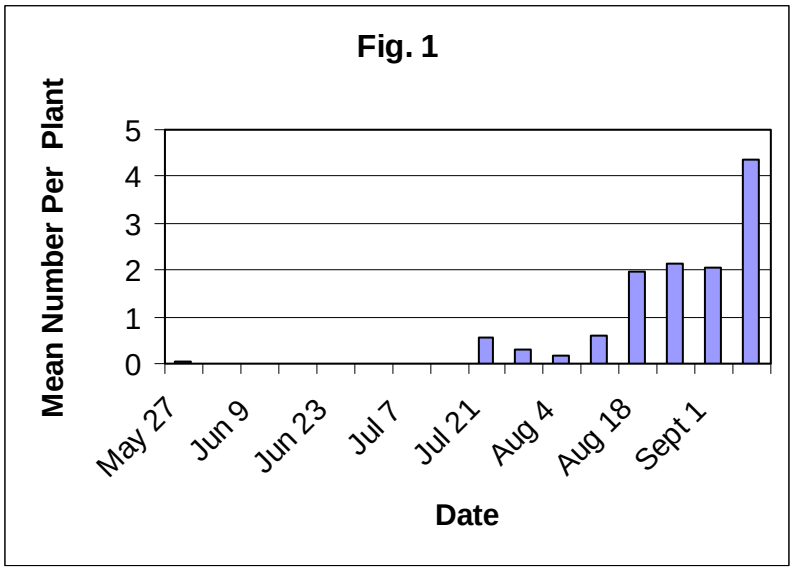
Objective 2: Evaluate the use of mass trapping as a non-pesticidal management tactic against *Halyomorpha halys* in an industrial park setting – We conducted a pilot study to access the potential for mass trapping of *H. halys* using three treatments: pheromone baited football traps, unbaited football traps and a no trap controls. Populations at this property were sampled once a week using foliage beat samples around study building beginning in May 2008. All sites were monitored once a week through the end of September 2008. Beginning in late August 2008, we set up a series of traps baited with high levels of attractant (20 mg), placed in a variety of locations, around 4 buildings with a known history of *H. halys* problems.

Objective 3: Evaluate tenant satisfaction with mass trapping as a management tool for *Halyomorpha halys*. – In the spring of 2009, we conducted a post-trial survey that evaluated, via face to face interviews, participant satisfaction with the program. The results of this survey were compared with pre-trial survey responses and used to evaluate the potential for adoption of the program.

Progress

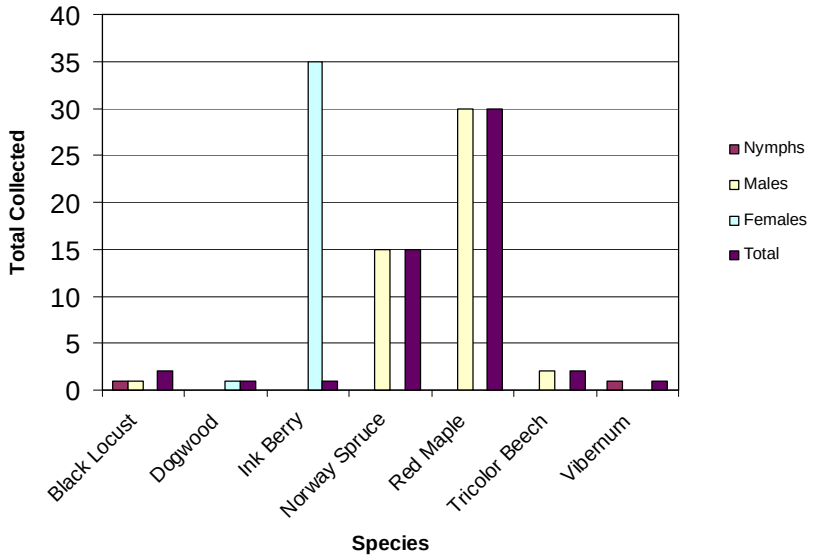
Pretrial survey: Face-to-Face pretrial surveys were conducted for all building in the studies and resulted in responses from 25 people per building. Overall, interviewees were aware of the current problem (90%) with *H. halys* each fall and considered them an annoyance and hindered their ability to work. On average, 55% of the interviewees were aware that *H. halys* was an invasive insect and that it had been introduced into Allentown from Asia. Twenty five percent indicated that they had spayed an insecticide in their office to solve the problem and that it was only a short term solution. Others (30%) indicated that their solution was to squash and discard the insects despite the potential odor issues. The remaining interviewees indicated that they were unaware of potential control options. All of the people interviewed indicated that they would prefer a nonchemical control option if it were available.

Mass trapping study: Sampling of the foliage surrounding the buildings used in the study was begun on May 27, 2008 and continued on a weekly basis until the end of September. Thirty different species were sampled including black locust, red maple, American and Chinese dogwood, Norway spruce and vibernum. Initially, population densities ranged from 0 to 0.1 individuals per plant (Fig. 1). Populations remained at these levels until the end of July when increases densities were observed with these greatest densities occurring in late September just prior to *H. halys* entering the buildings.



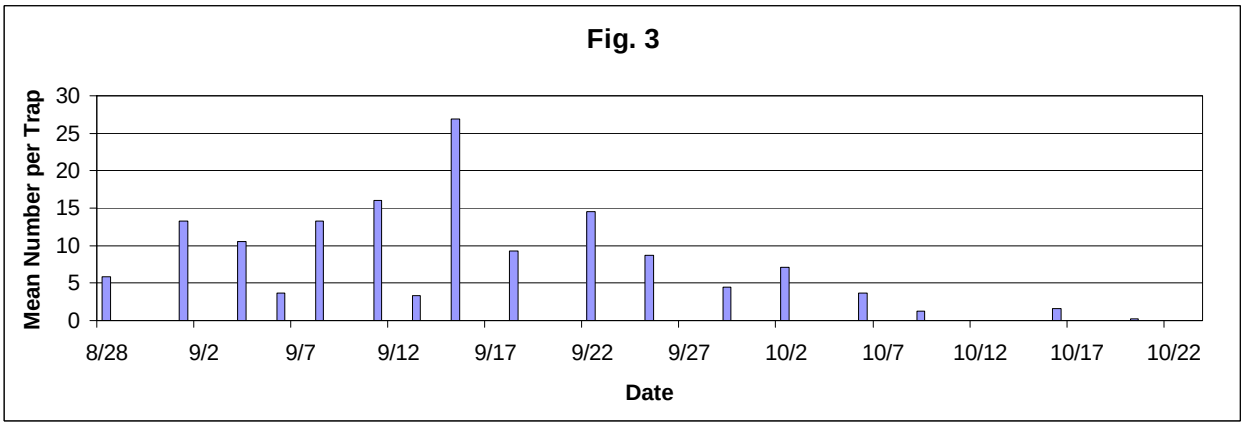
The majority of individuals collected from the plants sampled were found on ink berry, Norway spruce and red maple (Fig. 2 – Building 5 Counts). Individuals were also found on black locust, American and Chinese dogwood, beech and vibernum. Females also tended to show a preference for ink berry and dogwood while males preferred Norway spruce, red maple and beech.

Fig. 2



Based on the results of the weekly beat samples, pheromone traps were deployed around each building on plots most frequented by *H. halys* (average of 7 traps per build). The weekly mean trap catches are presented in Figure 3. Trapping of *H. halys* occurred from August 28th through October 22nd. No individuals were caught after this date. The majority of the individuals catch were captured between September 2nd and September 27th.

Fig. 3



Post-trial survey: Following the study, follow-up interviews were conducted. Of those interviewed, 80% were interviewed prior to the initiation of the study. Of the interviewees that were initially interviewed, all indicated that the problem had been reduced but not solved. Those that initially indicated they had previously used insecticides to solve the problem stated that they did not feel that they were necessary after the program.

Outcomes

The results of this study showed that mass trapping has potential use in an industrial park setting. Further testing, however, is needed to evaluate its usefulness in a variety of additional locations. Studies evaluating the effect of trap density (maximum and minimum number needed), impact of building size and design and building maintenance (site of windows, vents, etc) need to be conducted. If these studies prove successful, implementation of tactic will proceed with the possibility of expanding it to homeowners.

Impacts

This project had the following impacts:

Safeguarding human health and the environment – The mass trapping system study demonstrated the techniques potential use as a non-pesticidal option for managing H. halys; however, further work is needed before this tactic can be employed on a wide scale. If successful, two companies are interested in offering the system to the general public (ChemTica International - pheromone production and AgBios - trap production) thereby potentially impacting thousands of people in the Northeast and mid-Atlantic areas.

Implementation of IPM – This project documented the potential success of one IPM tactic – the use of pheromone technology to mass trap an invasive insect.