Citizen Science Program: Harlequin Bug Super Trap Plants

Study Experimental Protocol

Introduction:

Trap cropping is a unique method of managing pests. It draws pest to a specific plant or planting, and away from the main crops being grown. We aim to greatly improve the method using the aggregation pheromone of harlequin bug discovered at the USDA ARS Invasive Insect Biocontrol and Behavior Laboratory. We have developed a plant-attractant combination that is a "super trap plant" stimulus attracting all harlequin bugs (males, females, and nymphs). If the bugs are removed within a few days of their arrival, this could minimize pest pressure in the immediate area, and especially, on your main planting of cole crops (cabbage, broccoli, cauliflower, kohlrabi, Brussels sprouts, radish, horseradish, mustard, arugula, etc.). This protocol details how we expect cooperating gardeners and growers to employ the experimental trap plant system.

Set up:

We will provide you with a kit, including typically four cold-hardy collard plants 8-12 inches high in a 6 inch pot, each with a 6- inch circular sub-irrigation tray, and an experimental aggregation pheromone lure on a stake anchored in the ground. A 3cm layer of field soil goes over the surface of the soil in the pot to help prevent moisture loss. A labeled flag distinguishes each treatment, and allows you to report each plant's captures separately. We will work with you on our initial visit, to locate the plants where we think they will best attract harlequin bugs away from your vulnerable crops. Typically, this will be around or near the perimeter of your main garden or farm plantings.

Data Collection and Monitoring:

Each kit will include the following materials to allow you to collect specimens. Please contact us when your supplies are running low. We will send more.

- Flexible forceps
- Several 1x2" and 2x4" ZipLoc Bags
- 2 Black permanent Sharpies
- Data collection sheet

The entire trap plant as well as a 12 inch radius from the plant should be inspected for harlequin bug adults, eggs and nymphs at least twice a week. Inspect the undersides of the leaves, stems and under debris on the ground. Be thorough, but limit your evaluations to 2 minutes per plant. Collect specimens in 1x2" ZipLoc, and be sure to clearly label the full date, treatment and number of specimens. If

collections are greater than 5 adult or nymphs, use larger Ziploc bag. Please freeze these specimens; we will retrieve these at a later date.

We want to compare the captures on the trap plant with the numbers of harlequin bugs on your main food crops. Evaluate your food crops on a weekly basis. In addition to cole crops, inspect your leafy greens for these creatures. Harlequin bugs feed on cleome and arugula, and wild mustard-family plants, and sometimes occur on okra beans (especially green pods), spinach and chard. Make counts and document in the appropriate column on your field data sheet and note the host plant.

Reporting and Data Submission:

This is the easy part. We've established a **"harlequin hotline"** specifically for this study. **Call (301) 892-6797** and report the number of bugs (adults and nymphs) collected on trap plants (noting plant number, if you have more than one), and any other observations you make. We'll then input your data, and share it with you and other cooperators.

We encourage you to take photos throughout this experiment. Feel free to send any field observation photos related to this experiment to anthony.dimeglio@ars.usda.gov. We'll sort through them and update our blog on a weekly basis, so you can share the experience with other growers.

Site visits:

We will make at least 3 site visits throughout the course of this study. During the initial visit we will work with you one-on-one to explain the experiment and set up the trap plants. Together we will conduct a mock evaluation and answer any question you may have about the study. In mid-summer we will make a field visit, to check in on the status of the study and gather some feedback on experimental design. Together we can help improve this set-up to minimize pest outbreaks. Finally, we will return to gather supplies, check-in, and close with your final feedback—this will most likely be in mid-October. You will be invited to meet other growers during an Autumn Harvest Celebration where we'll present preliminary data and discuss best ways to manage these bugs in future years.

We are committed to helping you manage your harlequin bugs! On an as-needed basis, we can consult with you and if possible make site visits. This trap cropping strategy does not guarantee that harlequin bug pest pressure will be low this season. If you experience high insect pressure, please contact us. There may be other remedies that we can provide. If the experimental trap plant wilts, drops leaves or becomes severally damaged from other forces (i.e. drought, storm events, pest pressures) please contact us either via email or leave a voicemail on our hotline; we'll replace it promptly.

We look forward to working with you to develop this new and non-toxic way to protect your vegetables, and to outsmart the harlequin bugs.