

## **ASTER LEAFHOPPER RESEARCH UPDATE**

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### **What is an aster leafhopper?**

Aster leafhopper is an important insect pest of fresh market vegetables primarily because it transmits aster yellows phytoplasma, which is a disease of celery, carrots, lettuce and, occasionally, onions and potatoes. Disease symptoms vary from crop to crop, but affected plants typically have distorted, discolored foliage and a bitter taste and are therefore unmarketable.

### **How do leafhoppers pick-up aster yellows phytoplasma?**

Leafhoppers pick up the phytoplasma after extended feeding (hours to days) on infected plant tissues. The phytoplasma circulates in the insect's body and multiplies during a two to three week latent period, during which time the insect cannot transmit the pathogen. Once the leafhopper becomes infectious, it may infect healthy plants for the rest of its life, and this transmission process only takes a few minutes to a few hours of feeding. Once plants acquire the phytoplasma, nothing can be done to cure the plant; control efforts should prevent further spread of the disease by stopping aster leafhoppers from feeding on healthy plants.

### **Why should I care about the interaction of non-crop plants with the leafhoppers?**

Both the aster leafhopper and the aster yellows phytoplasma can use many plant species as hosts. In many types of agricultural situations, the crop field is also a home for other species of plants whether they have been intentional placed there or not. Many carrot growers use some type of cereal cover crop in the carrot fields, to provide horticultural benefits to the carrots by improving soil conditions. The cover crops are usually killed as the carrots start growing, in order to prevent the competition for water and nutrients. There is usually some overlap when the two plants are growing at the same time in the field. On the other hand, non-crop plants are also present as weeds in many fields especially later in the season, when it becomes difficult to enter the field with tractors to apply herbicides. The cover crops, as well as the weeds, provide alternative hosts for the leafhoppers and a source for picking up the aster yellows, therefore its important to understand how the presence of these non-carrot plants affect leafhopper abundance in the carrot crop.

### **How do aster leafhoppers respond to the presence of barley?**

In the summer of 2010, the MSU vegetable entomology lab conducted a small-plot carrot research trial, where we investigated the impact of barley borders on the abundance of aster leafhoppers. Carrot (*var.* Canada) was planted in 10' by 10' plots at the MSU Montcalm Research Farm in Entrican, MI. Four treatments were assigned to carrot plots in a randomized complete block design replicated 6 times (N=20). We counted weekly the number of aster leafhoppers on yellow sticky cards placed into the center of the carrot plots.

The four treatments were:

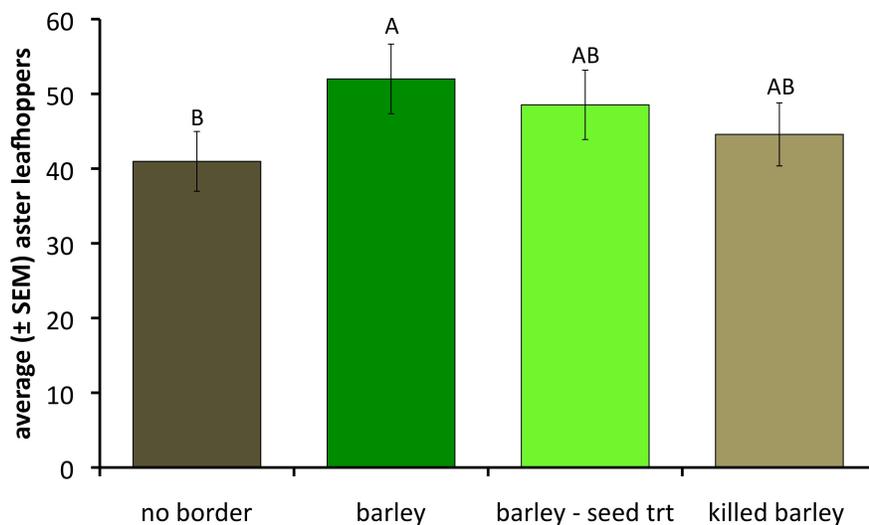
1. carrot plot without a border;
2. carrot plot with a 2' barley border;
3. carrot plot with a 2' barley border, where barley was seed treated with Cruiser<sup>®</sup> insecticide;

4. carrot plot with a 2' barley border, that was killed with a herbicide after the plants grew to about 2' tall stage;

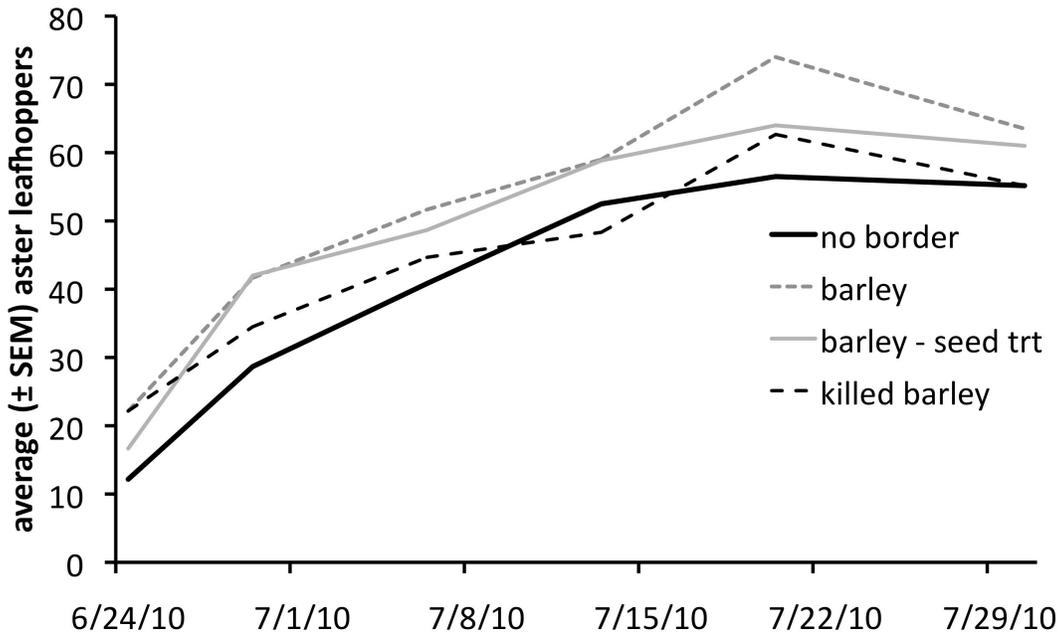
*Results:* The number of aster leafhoppers was significantly higher in plots that had a living, non-treated barley border. The lowest number of leafhoppers throughout the season was in those plots that did not have a barley border (Figures 1 & 2). The other two treatments (insecticide and herbicide treated barley borders) were in between the other two treatments regarding the number of leafhoppers on the sticky cards.

Therefore, the presence of living barley near carrots at a time when leafhoppers are present should be avoided, because the carrots will have more leafhoppers on them.

**Figure 1.** Seasonal average of aster leafhoppers on yellow sticky traps in carrot plots in an experiment testing the effects of barley borders around carrot plots. The lowest numbers of aster leafhoppers were found in carrot plots that did not have a barley border planted around them.



**Figure 2.** Change over time in the abundance of aster leafhoppers found on yellow sticky traps in carrot plots with different barley border treatments.



### How do aster leafhoppers respond to different weed species?

In an experiment at the Southwest Research and Extension Center, Benton Harbor, MI, we examined the effect of the presence of common weed species on the number of aster leafhoppers in carrot plots. The weeds were the following species: marestalk, ragweed, long-leaf plantain, wild carrot, corn chamomile, and common plantain. These weed species are host for the aster leafhopper, and many of these species have been found positive for aster yellows phytoplasma as well. Carrot (*var.* Canada) was planted in 10' by 10' plots in a randomized complete block design replicated five times (N=20) and weed treatments were assigned randomly to plots within blocks. Each replicate contained a control plot that did not have any weeds. At the end of July, four weed plants of the same species were transplanted into a plot, therefore each plot represented a single weed species treatment. The weeds were placed in the imaginary corners of a 4' square in the middle of the carrot plot. Each plot had a single yellow sticky trap at the center that was changed weekly. Numbers of aster leafhoppers on the yellow traps were recorded weekly starting 8/4/10 through 9/9/10.

*Results:* The number of aster leafhoppers was extremely high in our carrot plots (over 100 aster leafhoppers per trap, per week, on average). We did not detect any significant differences among the number of aster leafhopper among our weed treatments (Figure 3). This may be partly due to the fact that the entire field was inundated with leafhoppers, washing out any differences that may exist.

**Figure 3.** Average number of aster leafhoppers on yellow sticky traps in carrot plots infested with different weed species. The experiment was conducted at SWMREC, Benton Harbor, MI in summer 2010. There were no significant differences found in the number of leafhoppers among the treatments.

