## ASTER LEAFHOPPER INTEGRATED PEST MANAGEMENT IN CARROTS

Aster leafhoppers are a significant insect pests of fresh market vegetables primarily because they transmit *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, taste bitter and are therefore unmarketable.

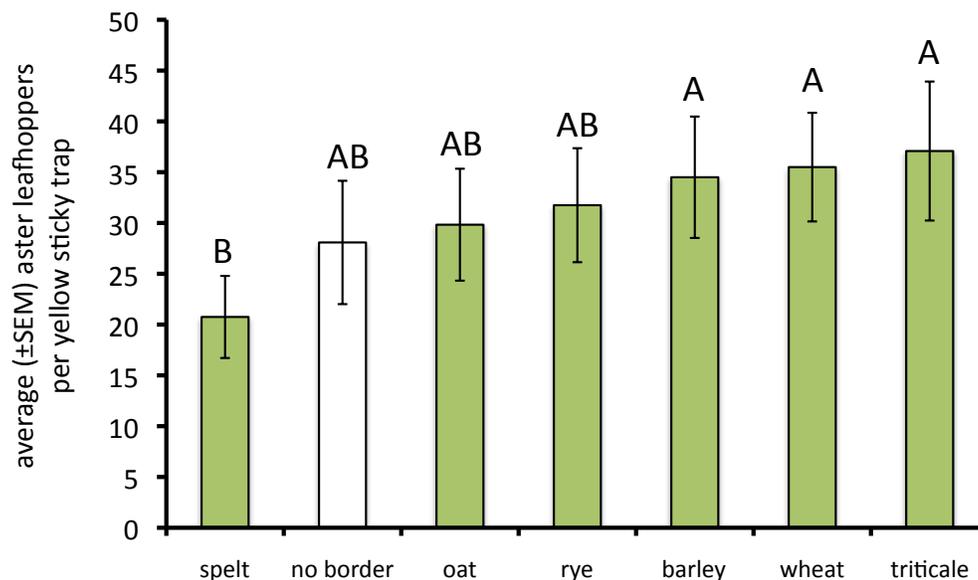**Interaction of non-crop plants with aster leafhoppers.**
Both the aster leafhopper and the aster yellows phytoplasma can use many plant species as hosts. In many types of agricultural situations, the crop field is also a home for other species of plants whether they have been intentional placed there or not. Many carrot growers use some type of cereal cover crop in the carrot fields, to provide horticultural benefits to the carrots. The cover crops are usually killed as the carrots start growing, in order to prevent the competition for water and nutrients, but 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. 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.

**The effect of cover crop border treatments on aster leafhopper abundance in carrots.**
In the summer of 2011, the MSU vegetable entomology program conducted a small-plot replicated carrot trial, where we investigated the impact of different species of cover crop borders on the abundance of aster leafhoppers in carrots. Carrot (*var.* Carson) was planted in 10' by 10' plots at the MSU Montcalm Research Farm in Entrican, MI. Seven border treatments were assigned to these carrot plots in a randomized complete block design replicated 3 times. Borders consisted of a 2-foot wide band of cover crop around the carrots. We counted weekly the number of aster leafhoppers on yellow sticky cards placed into the center of the carrot plots.
The seven cover crop treatments were: none, barley, oat, rye, spelt, triticale, and wheat.

*Results:* Oat, rye, barley, wheat, and triticale borders increased the numbers of leafhoppers in the carrot plot relative to the no-border treatment. Carrot plots with spelt borders had the fewest leafhoppers on average, and this number was significantly less when compared to barley, wheat and triticale border treatments. The presence of triticale almost doubled the average number of leafhoppers in the carrot plot relative to the spelt.

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**How do aster leafhoppers respond to different types of weeds?**

In an experiment at the MSU Southwest Research and Extension Center, Benton Harbor, MI, we examined the effect of weed management on the abundance of aster leafhoppers in carrots. Carrot (*var.* Carson) was planted in 20' by 25' plots in a randomized complete block design replicated five times and herbicide management treatments were assigned randomly to plots within blocks. Plots were either treated with a post emergence grass (Select) or a broad leaf herbicide (Lorox), or both. Some plots were treated twice and some three times with these herbicide treatments throughout the season. Each replicate contained a control plot that did not have any weeds (hand weeded as needed). 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 7/14/11 through 9/1/11.

*Results:* The average number of aster leafhoppers was highest in the hand weeded plots, which did not have weeds. Plots that were hand weeded had similar leafhopper abundance as plots that had grassy weeds. Eliminating grasses but leaving broad-leaved weeds in the plots significantly reduced the abundance of leafhoppers in carrots, when compared to all of the other treatments.