ASPARAGUS MINER INTEGRATED MANAGEMENT

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Research in the MSU vegetable entomology lab focuses on the IPM of the asparagus miner (*Ophiomyia simplex* (Loew), Diptera: Agromyzidae). This insect is a putative vector for pathogenic species of *Fusarium* fungus, which is the causative agent for "early decline syndrome" in asparagus fields. Fusarium can decrease the life span of an asparagus field by 5-8 years, making it economically unsustainable to continue production.

asparagus miner adult feeding on asparagus flower

Currently ongoing projects:

1. ASPARAGUS MINER DEGREE DAY MODEL

We use weather data and combine this with monitoring for different asparagus miner life stages to determine the growing degree days when key events happen. This information will be shared with growers through MSU's Enviro-weather website.

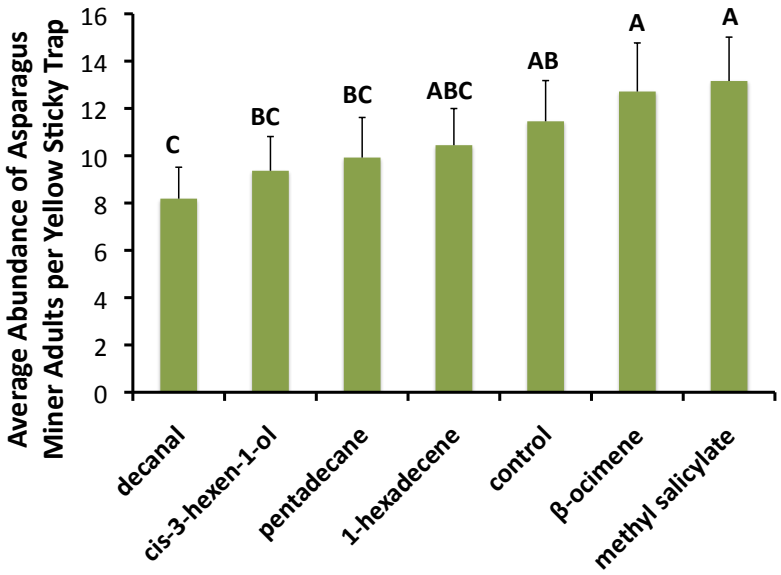
Summary of the predicted accumulated growing degree-days from the 2011 field season in Oceana Co., MI for different adult and immature phenological events and the deviation from expected in 2012 using the Baskerville-Emin method, a biofix date of 1 March, and a base of 12.05°C in combination with weather data from the MSU Enviro-weather Hart Station.

Predicted GDD	Phenological Event	Deviation from Predicted in 2012 (GDD)
Adults		
100	Beginning of flight	57.2
490	1st peak	83.1
940	Beginning of 2nd generation	48.3
1530	2nd peak	43.9
1850	End of flight	350.2
Immatures		
380	First appearance of larvae	na[a]
490	First appearance of pupae	na[a]
670	1st larval peak	96.9
940	1st pupa peak	216.7
1530	2nd larval peak	104.7
1600	2nd pupal peak	274.8

[a] Estimates for these two events were considered too biased to include in analysis because late harvesting for older fields unduly delayed data collection

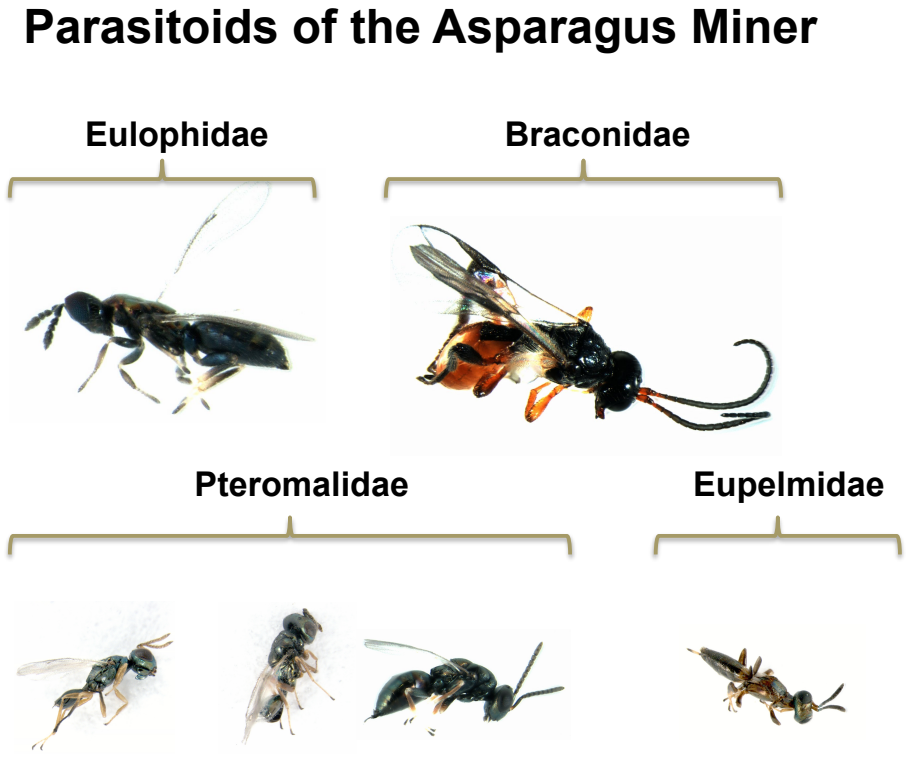
2. ASPARAGUS MINER MONITORING WITH BAITS

We are exploring the chemical interaction of the asparagus miner with the asparagus. In particular, we are looking for plant volatiles involved in the attraction of the miner to plants. Plant volatiles can be used in management by incorporating them into baits on traps to improve monitoring or using them in the population management of adult miners. In 2012, we found that decanal was significantly repellent to adult miners relative to the control (see figure to the left).



3. ASPARAGUS MINER BIOLOGICAL CONTROL

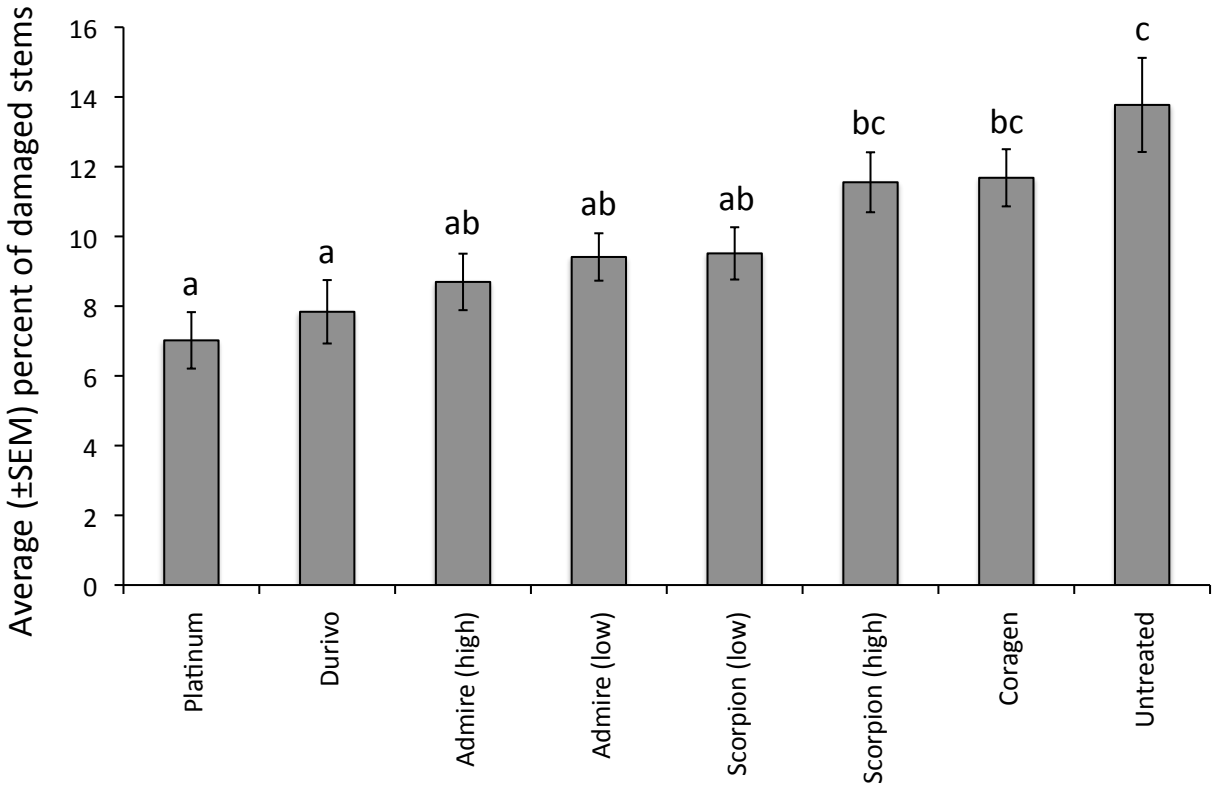
We are currently in the process of identifying naturally occurring arthropod parasitoid species of the miner pupae, as well as examining their abundance in commercial asparagus fields. So far, parasitoids have been identified from the *Pteromalidae*, *Eulophidae, Eupelmidae* and *Braconidae* insect families. These all belong to the larger group of parasitic wasps. About 14% of the asparagus miner pupae were parasitized by the two most abudant groups.



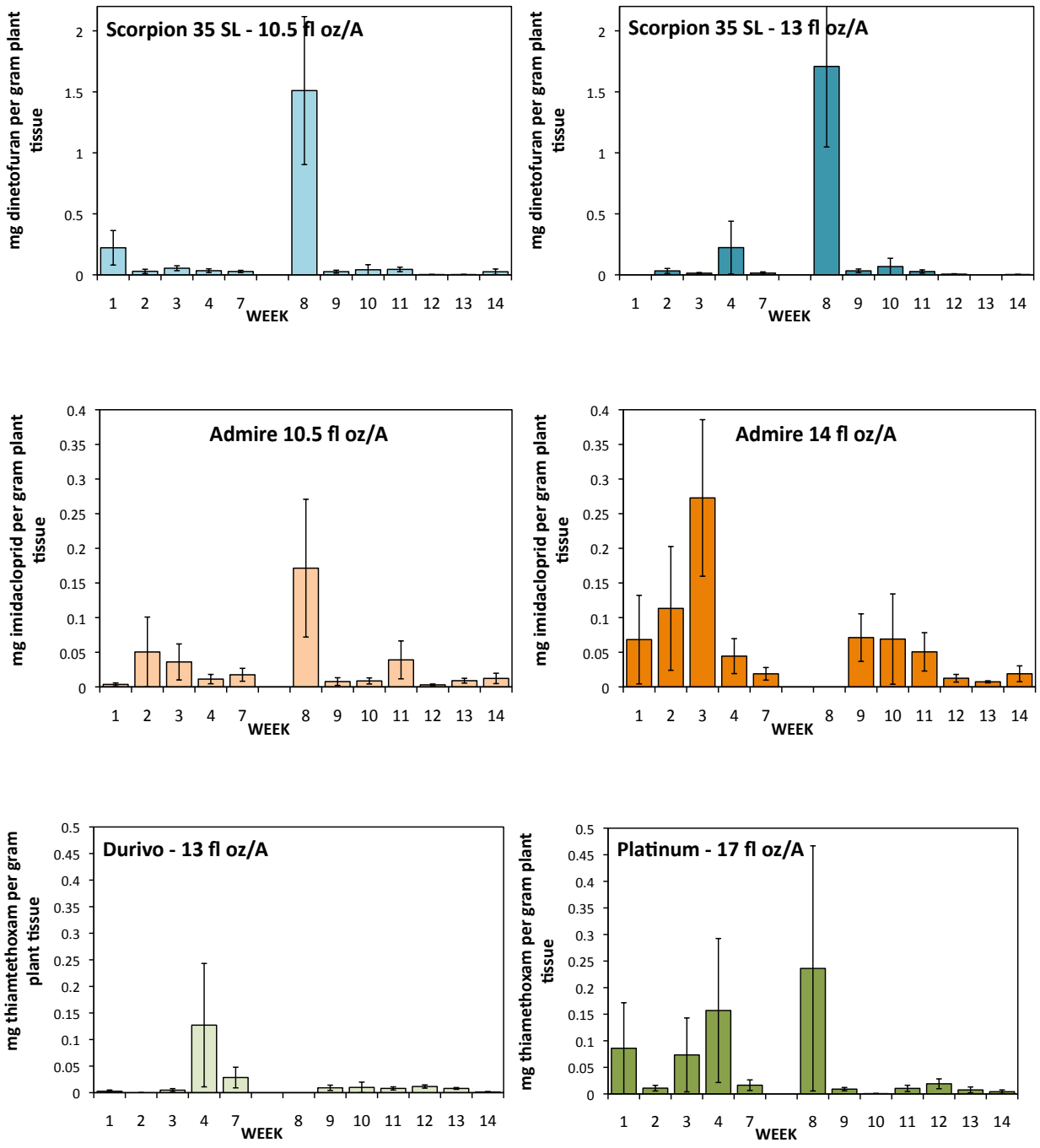
4. ASPARAGUS MINER CHEMIGATION TRIAL

Since asparagus miner larvae feed inside the stems, contact insecticides are unable to reach or control them. Growers are looking for ways to minimize damage by the larvae using chemigation. Increasing drought periods during Michigan summers are forcing growers to invest into watering equipment for their asparagus fields, therefore using a drip system to deliver a systemic insecticide to reduce asparagus miner larval populations is currently being investigated.

In 2012, we planted a new asparagus plot to investigate the efficacy of drip irrigation to distribute insecticides to asparagus plants. After planting, sub-surface irrigation lines were installed and insecticides were administered through the irrigation lines twice during the growing season. First application occurred when new growth was starting to emerge, in an attempt to encourage insecticide uptake during a period of active plant growth, and second application was made in the middle of July, when the summer generation of miners was actively laying eggs. A couple of insecticides significantly reduced the percent of damaged stems, with the thiamethoxam-based compounds (Platinum and Durivo) being the most effective (see figure below). Asparagus miner damage in plots protected by these two products fell from 14% to about 7%.



Percent of damaged asparagus stems in an experimental drip irrigation trial. Drip applications were made on two dates, 21 May and 13 July. Rates applied: Platinum (5.67 oz/A), Durivo (13 fl oz/A), Admire (high) (14 fl oz/A), Admire (low) (10.5 fl oz/A), Scorpion (low) (10.5 fl oz/A), Scorpion (high) (13 fl oz/A), and Coragen (7.5 fl oz/A).



Graphs above show the amount of insecticide taken up by newly planted Millennium asparagus plants in a chemigation trial in 2012. Applications were made twice during the season, at the rate indicated on the graphs. First application happened when plants started growing in late May and again in the middle of July during the second peak of asparagus miner egg laying. Chemigation tubes were knifed into the soil (~5-10 in deep), and were slightly offset from asparagus rows. Weeks 1-7 represent results over time for the first application, and the second application was made during Week 7.