

Asparagus miner management

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Research in the MSU vegetable entomology lab focuses on the Integrated Pest Management of the asparagus miner. This insect is a putative vector for pathogenic species of *Fusarium* fungus, which is the causative agent for “early decline syndrome” in asparagus fields.

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 EnviroWeather website.

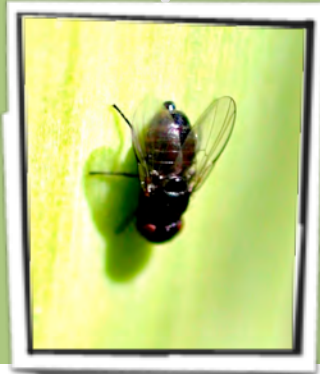
Summary of the predicted accumulated growing degree-days from the 2011 field season in Oceana Co., MI for different adult and immature phenological events and the deviation from expected in 2012 using the Baskerville-Emin method, a biofix date of 1 March, and a base of 12.05°C in combination with weather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



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MONITORING WITH BAITS

We are exploring the chemical interaction of the asparagus miner with asparagus odors. In particular, we are looking for plant volatiles involved in the attraction/deterrence 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 management of adult miners. In 2012, we tested single chemical components and we found that decanal was significantly repellent to adult miners relative to the control. This pattern holds up for 2013 (see figure to the right), when we tested a blend of different chemicals in the bait.



Abbreviations

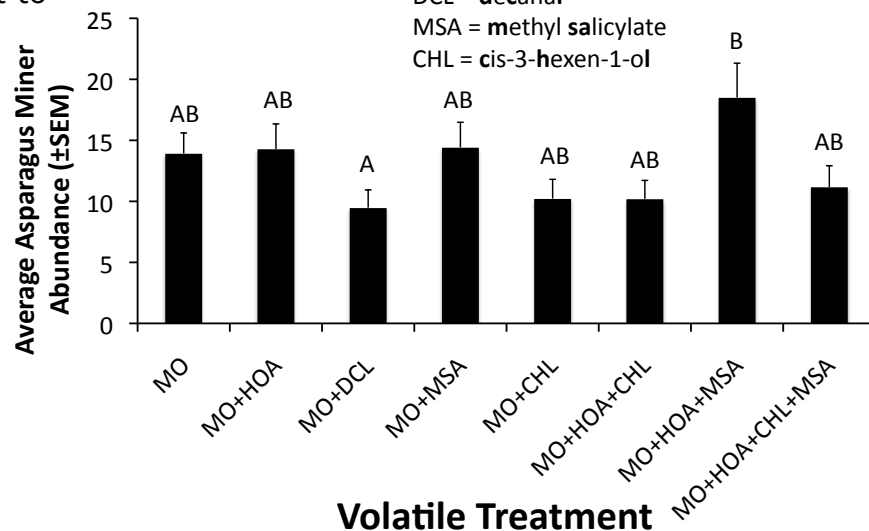
MO = mineral oil

HOA = hexanoic acid

DCL = decanal

MSA = methyl salicylate

CHL = cis-3-hexen-1-ol



Volatile Treatment

Abundance of asparagus miners caught on sticky traps baited with one of eight different treatments. None of the volatiles were significantly different from the control, however, overall volatile did significantly affect the abundance of asparagus miners between the most and least attractive combination of volatiles ($F_{7,1399}=8.99$, $P<0.001$). Abbreviations are given above the graph.



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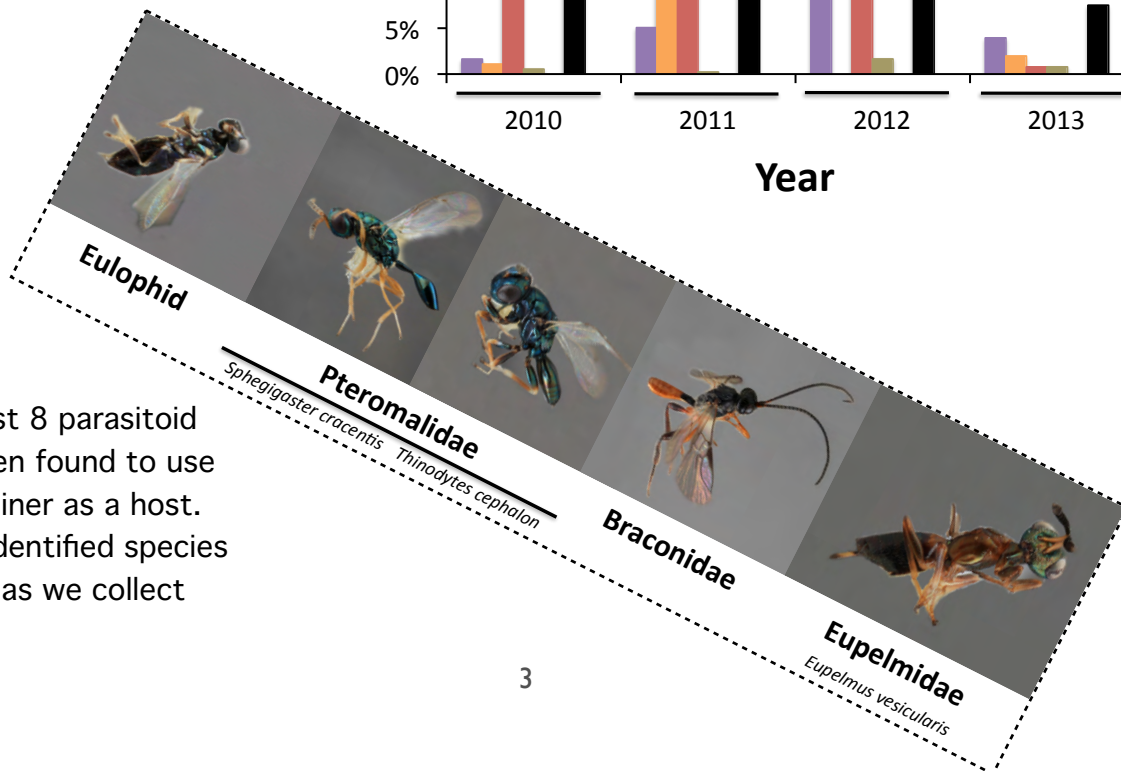
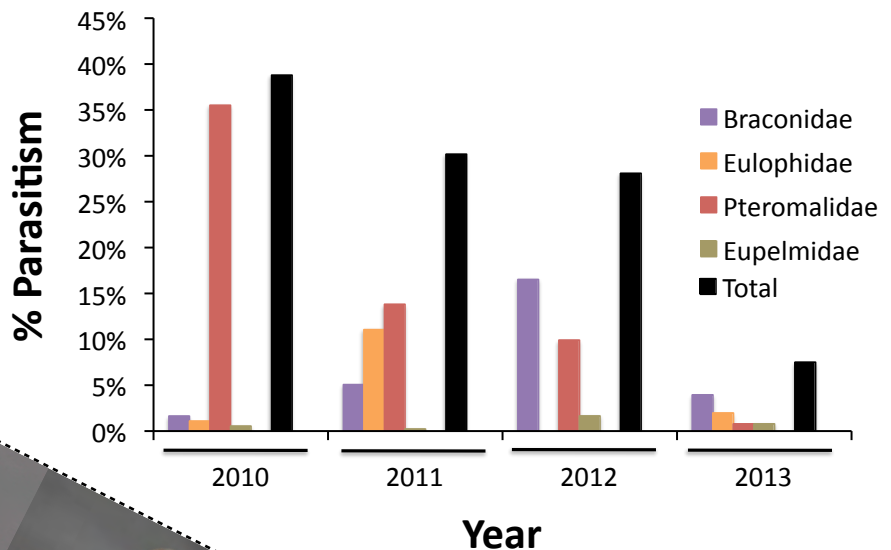
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ASPARAGUS MINER BIOLOGICAL CONTROL

We are currently in the process of identifying naturally occurring arthropod parasitoid species of asparagus 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. In 2013, 8% of the asparagus miner pupae were parasitised. See the figure to the right for more details.

Overview of parasitoid abundance from Oceana Co., from 2010-2013. 2013's data is not yet complete. The pteromalids are the most common parasitoids in most years, while the braconids are the second most abundant.



A total of at least 8 parasitoid species have been found to use the asparagus miner as a host. The number of identified species is likely to climb as we collect more pupae.

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CHEMIGATION TRIAL

Since asparagus miner larvae feed inside the stems, contact insecticides are unable to reach and control them. We are currently investigating the potential for drip systems to deliver a systemic insecticide to reduce asparagus miner larval populations in stems.

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. The same insecticide applications were made in 2013 as in 2012. First application in both years occurred when new growth was starting to emerge, and second application was made in the middle of July, when the summer generation of miners was actively laying eggs.

The thiamethoxam-based compounds (Platinum and Durivo) were the most effective (see figure). Asparagus miner damage in plots protected by these two products fell from 50% in the control plots to about 30%. The longevity of the insecticides in the stems is about 3-4 weeks.

