Dietary Analysis of Green Lacewing Using DNA Metabarcoding to Evaluate Its Potential as a Biocontrol for Almonds

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PROJECT SUMMARY

Objectives for current year:

- Survey of Green Lacewing (GLW) species and relative abundance in almonds in Kern County to assess the impact of GLW predation on pest population.
- Identify prey of GLW larvae found in almond orchards in the southern San Joaquin valley through gut content analysis by metagenomics.

Background and Discussion:

Green lacewings (GLW) (*Chrysopa* and *Chrysoperla* spp) are ubiquitous in almonds in the San Joaquin Valley. Typically known as aphid predators, the ecosystem services provided by these widespread generalist predators are still not fully understood. We suspect that mites, which are common pests of almonds, likely make up a large part of their diet, suggesting that lacewings might be effective as a biocontrol agent against mites. However, any insect egg or larva is a potential target for these voracious predators. Lacewings have been shown to prey on shallot aphids that are found in strawberry crops, fennel aphids, a major pest of fennel, the horticultural pest azalea lace bugs, and the cotton aphids, to name a few examples.

In a two-year trapping survey using known attractants tuned specifically to GLW (Brad Higbee) showed *Chrysoperla carnea* and *Chrysoperla commanche* were by far the most abundant species. This is significant because in the *Chrysoperla* genera, larvae are predacious, but adults are not. Identifying the prey species make-up and impact provided by these natural predators will benefit the almond industry by demonstrating environmental stewardship and, coupled with other information being developed on pesticide impacts to GLW, will help inform management decisions that may impact conservation of these natural biocontrol agents. Depending on the successful identification of prey consumed by GLW in Kern County orchards, there is potential to expand this project beyond Kern County.

During this project period, we will analyze the dietary preference of GLW larvae collected in Kern County orchards and evaluate its potential as a biocontrol method for almonds. With the advent of state of the art, high-throughput sequencing technology and increased availability of reference genomic sequences of insect species, we will perform gut content analysis on GLW larvae using DNA metagenomics via high-throughput sequencing, which is much more reliable, sensitive, and quantitative than conventional approaches, e.g., PCR-based molecular analysis.

We have begun sample collection and the goal is to conclusively determine whether mites and other almond pests make up a large portion of the diet of GLW, allowing us to evaluate the value of GLW as a sustainable management tool for almond crops.

Project Cooperators and Personnel: Brad Higbee, Wonderful Orchards.

For More Details, Visit

- Poster location 95, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2017) at Almonds.com/ResearchDatabase
- Related project: 16-ENTO6-Haviland