

**2017 Statewide IPM Report  
July 13, 2018**

**Managing Thrips in Commercial Eggplant Production Systems via Implementation of  
Macaranga Border Crops**

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**Specific problem to be addressed:**

**Re-occurring pest problems need long term, alternatives to crop protection chemical solutions.**

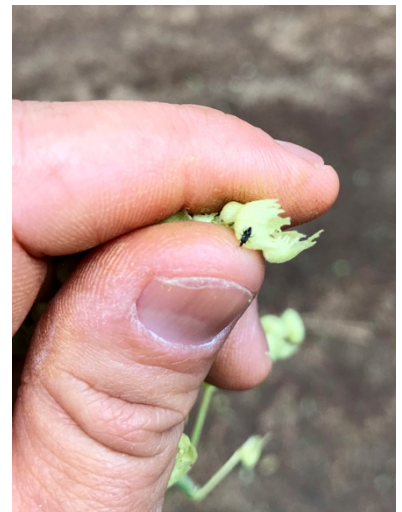
Long eggplant (*Solanum melongena*) cultivars are preferred by many of Hawaii's growers and consumers. Commercial producers face resistance issues in managing Western Flower Thrips (*Frankliniella occidentalis*) and melon thrips (*Thrips palmi*), as many conventional and reduced-risk insecticides are not highly effective against these species of thrips. Even the slightest physical damage caused by thrips (streaking) will create financial losses for commercial producers.

The minute pirate bug is an effective predator of the adults and larvae of all thrips species (Ramachandran et al. 2001, Reitz et al. 2003). Funderburk (2009) discovered that a ratio of one minute bug predator to 180 thrips was sufficient to suppress thrips population in field conditions. Dr. Robert Hollingsworth (2015) of the USDA ARS found that the *Macaranga tanarius* tree served as a good host for the minute pirate bug and evaluated its effect on thrips management in greenhouse orchid systems. He indicated that *Macaranga tanarius* was a fast growing and easy to cultivate tree that supported anthocorid predators.

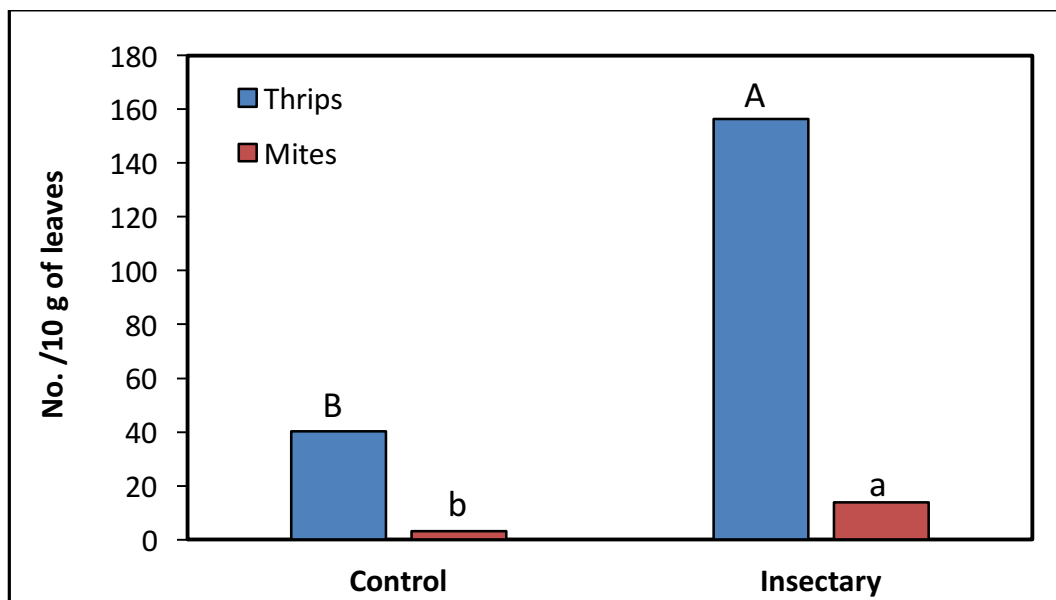


During this reporting period, we installed two field trials at the Waimanalo Research Station to evaluate the effectiveness of inoculating *Macaranga tanarius* flower panicles on eggplant to suppress thrips populations. Observations of the *Macaranga tanarius* flowers showed that flowers were more abundant in spring and summer months on Oahu. Flowers became less available in the fall (2017) and varied by location. In winter 2017, flowers were observed in Kahuku, Oahu, but nonexistent in Pearl City, Oahu.

We opted not to install an in row *Macaranga tanarius* cropping systems due to invasive nature of the plant and installed sunn hemp instead. UH CTAHR's Tolentino variety eggplant was transplanted in the middle of the



sunn hemp borders (insectary plot). For the control plot, the same variety of eggplant was transplanted, with no border crop. Plots were installed in February 2017 and sprayed weekly with wettable sulfur for mite control. Sulfur treatments were discontinued on the plants between the sunn hemp rows in May 2018. Male *Macaranga* flowers were collected in June 2018 from the Magoon Research Station. Eggplants between the sunn hemp borders were inoculated twice with the pirate bug infested flowers.

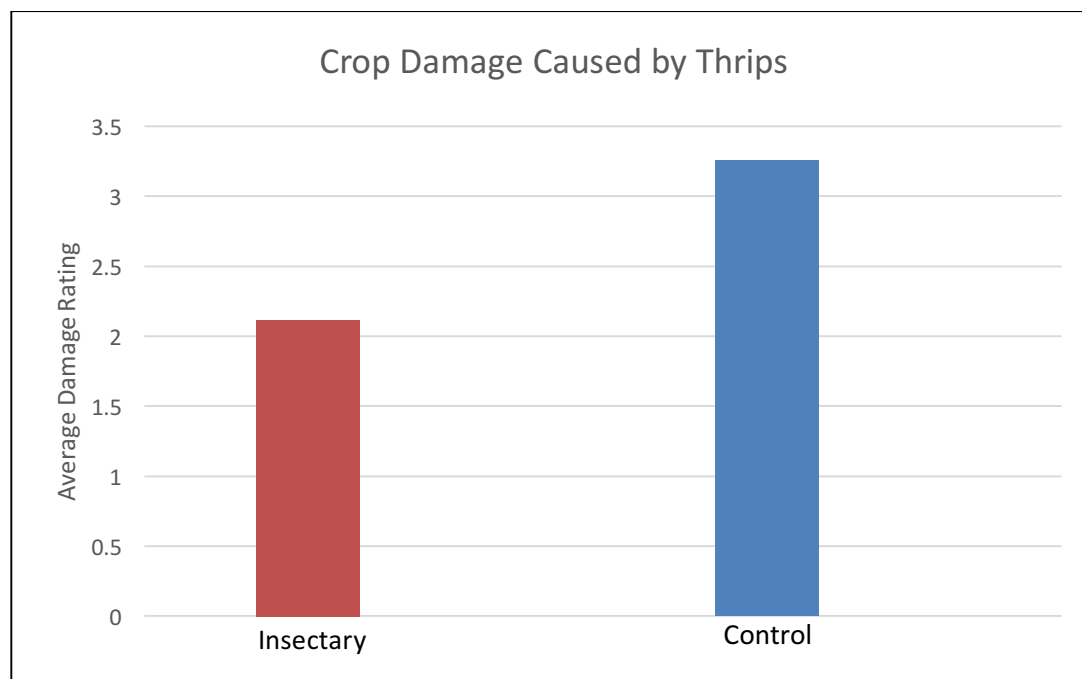




Three leaves per plant were randomly sampled and collected from each plot. Leaves were subjected to an alcohol leaf wash to dislodge the pests in a laboratory setting. Thrips and mites were counted by Dr. Koon Hui Wang's laboratory. Overall, the plants that were surrounded by the sunn hemp rows or insectary plants had higher levels of thrips and mites than the control plots which actively received sulfur treatments. This was largely due to the fact that predatory mites could not be distinguished from regular mites and pollen eating thrips commonly found on male *Macaranga* flowers could not be separated from thrips that damage eggplants under the microscope.

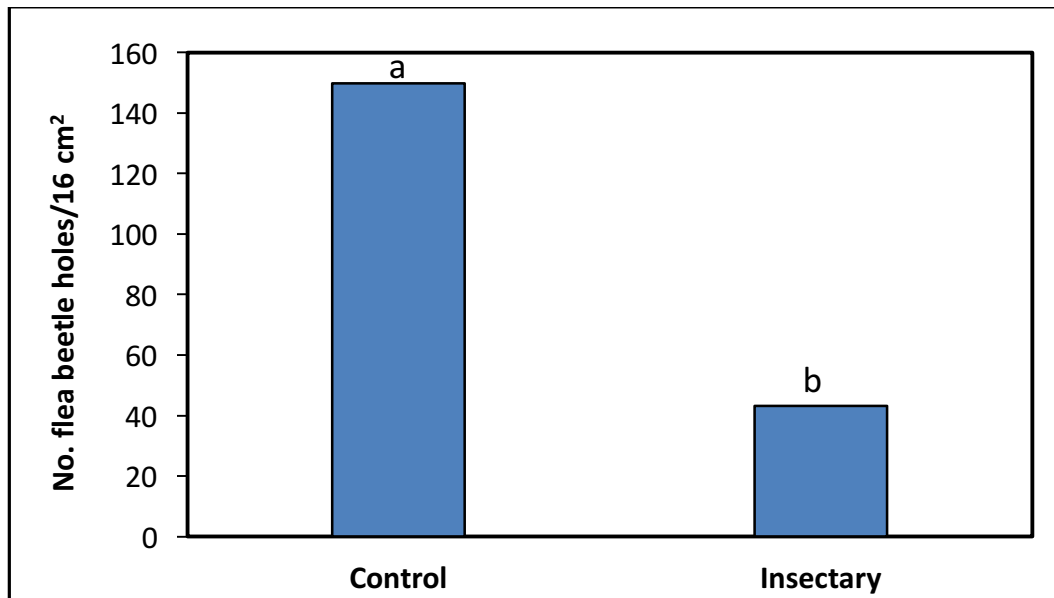


However, damage caused by thrips to marketable sized fruits was observed a week after treatment using a modified Kemerait et. al. scale of 0=none, 1=trace to 5%, 2=6-15%, 3=16- 35%, 4=36-67%, 5=68-100%. Preliminary findings showed that eggplants inoculated with the pirate bugs on *Macaranga tanarius* flower panicles had lower crop damage (2.1) as compared to the fruits in the control plot (3.3). When sunn hemp was chopped and placed under the plants and inoculated with *Macaranga* flowers, the damage decreased further from 2.2 to 1.8. Only 2.5% of fruits were Grade A in the control plots due to heavy scarring vs 16% in the *Macaranga tanarius* inoculated plots, with no other crop protection treatments.



Damage rating (fruit scarring) based on a modified Kemerait et. al. scale of 0=none, 1=trace to 5%, 2=6-15%, 3=16- 35%, 4=36-67%, 5=68-100%.

It was also noted that flea beetle damage was significantly lower as a result of the implementation of the sunn hemp borders with *Macaranga* inoculations.



### Unexpected Outcomes

The first two field trials were heavily compromised from unforeseen weather in Waimanalo in early 2018. Heavy rainfall and flooding in April 2018 affected overall plant health and vigor. A third field trial in scheduled to be installed in August 2018 and replicated for publication and educational purposes.

### Short Term Outcome & Preliminary Impacts:

Observations and preliminary data suggest that the inoculation of male *Macaranga tanarius* flower panicles can help to reduce thrips damage on long eggplant. It was also noted that flea beetle damage was significantly lower as a result of the sunn hemp borders with supplemental pirate bug inoculations. Additional time is needed to evaluate the timing of the *Macaranga tanarius* inoculations and the development of on farm applications. The State of Hawaii, Department of Land and Natural Resources is doing a good job eradicating *Macaranga* on Oahu, we had a difficult time finding male flowers for this trial.



### Activity Outputs

We anticipate providing ongoing farmer relevant training sessions to bring growers up to speed on

this advancing area of sustainable pest management, as more information becomes available. We introduced agricultural professionals, new and existing producers to this new and innovative IPM concept at three educational events:

- Integrated Pest Management for New Producers. June 13, 2018. GoFarm Hawaii, Pioneer, Waialua.
- Protected Culture Field Day, May 30, 2018 at the Waimanalo Research Station
- Maui IPM Workshop, May 23, 2018, Maui Cooperative Extension Office



### **Primary Linkages to External Groups**

Extension agents, specialists & researchers involved in this project have established a solid reputation for delivering timely, useful, relevant, sustainable quality outreach and education to Hawaii's commercial agricultural producers and professionals. We actively collaborate with the statewide new farmer program called, GoFarm Hawaii, the Sustainable and Organic Agriculture Program (SOAP) and with Western SARE Program to extend our reach in transferring new field based data to producers and agricultural professionals across the state.

### **Publications:**

None at this time.

### **Photos:**

<https://www.flickr.com/photos/150583970@N07/albums/72157686084675272>

### **References:**

Funderburk, J. E. 2009. Management of the western flower thrips (Thysanoptera: Thripidae) in fruiting vegetables. Florida Entomologist 92: 1–6.

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Hollingsworth, R. 2015. *Macaranga tanarius*, a remarkable source of anthocorids for greenhouse and tropical crops. ESA Annual Meeting.

Ramachandran, S., J. Funderburk, J. Stavisky, and S. Olson. 2001. Population abundance and movement of *Frankliniella* thrips (Thysanoptera: Thripidae) in northern Florida. *Agricultural and Forest Entomology* 3: 1–10.