

# Sustainable Pest Management

## Evaluating Efficacy of Organic Insecticides on Key Insect Pests of Leafy Greens in Hydroponic and Aquaponic Systems



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Cabbage looper on lettuce



Imported cabbage worm larvae



Aphids in between lettuce leaves



Aphids on a pak choi leaf



Insecticide	a.i.	Rate		a.i.	Rate
Pyganic	Pyrethrin	64 oz/acre	Sucrashield	Sucrose Octanoate Esters	1% v/v
Entrust	Spinosad	2 oz/acre			
Crymax	Bacillus thuringiensis	2 lb/acre	Adjuvant:		
Dipel	Bacillus thuringiensis	1 lb/acre	Latron	Modified phthalic glycerol alkyd resin	2 oz/acre
Debug Turbo	Azadirachtin	32 oz/acre	Oroboost	Alcohol ethoxylate	20 fl oz/acre

Several organic insecticides were tested for their efficacy in suppressing damage caused by cabbage looper and imported cabbage worm on Manoa lettuce grown in 15x21 sq in hydroponic boxes at the Poamoho Experiment Station, Oahu, HI. Two trials were conducted. Insecticides were sprayed weekly. Latron and Oroboost were used as surfactants in Trial I and Trial II, respectively. The key insect pests in these trials were cabbage looper, imported cabbage worm and diamond back moth. Damage caused by these insects on the lettuce was monitored at weekly interval.

### Summary

- Entrust followed by Dipel were most effective in suppressing common caterpillar pests such as cabbage looper, imported cabbage worm or diamond back moth on Manoa lettuce

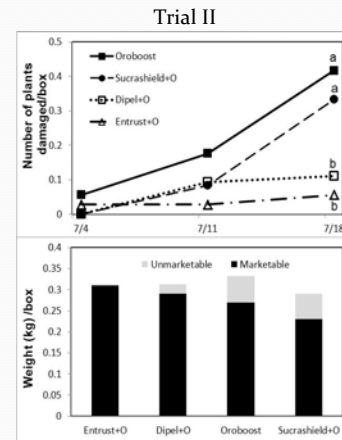
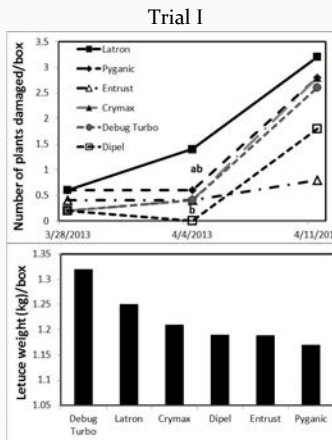


Fig. 1. Number of leaves with chewing damage caused by cabbage looper, imported cabbage worm or diamond back moth, and lettuce yield affected by organic insecticides in Manoa lettuce Trial I and Trial II of hydroponic experiment.

### Laboratory Assay

Laboratory assays were conducted to examine effects of organic insecticides on aphids. A leaf disk of 1.5-cm diameter infested with lettuce aphids collected from an aquaponic farm was sprayed with the designated insecticide and incubated for 1 and 5 days in Trial I and Trial II, respectively.

### Summary

Efficacy of most of these insecticides increased with mixing of Oroboost as an adjuvant except for Debug Turbo.

Among the insecticides tested, Debug Turbo was most efficient in killing aphids on lettuce leaves.

Insecticide	a.i.	Rate		a.i.	Rate
TriTek	Mineral oil	1 gal/100 gal	Mycotrol	<i>Beauveria bassiana</i>	0.5 quart/acre
M-pede	Potassium salt of fatty acids	2% v/v	Grandevo	<i>Chromobacterium subsugae</i>	3 lb/acre
Molt-X	Azadirachtin	10 oz/acre			

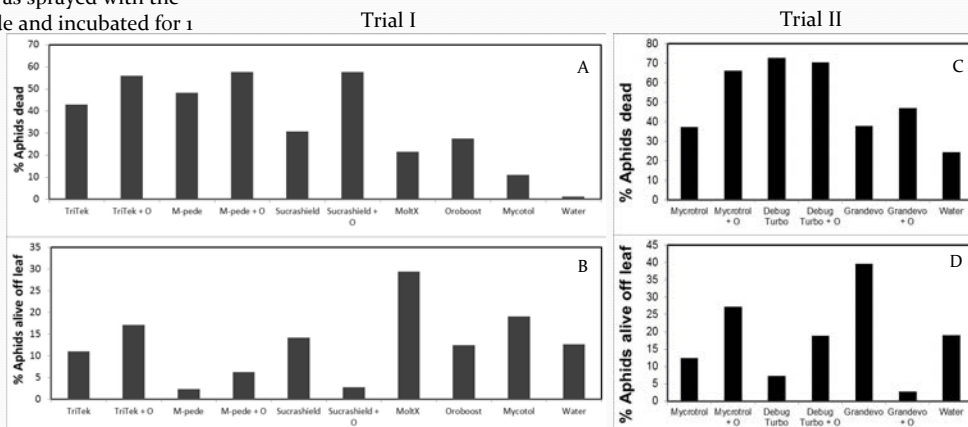


Fig 2. Percentage of aphids dead or alive but wonder off the leaf disk at 1 day (A, B) and 5 days (C, D) after insecticide spray on a lettuce leaf disk in the petri dish. Each spray treatment was composed of 5 replications.