Brassica Pests: Cabbage Webworm and Bagrada Bug

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Cabbage Webworm (*Hellula undalis*)

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- Economically important pest on brassica crops
- Greyish yellow with five reddish brown bands down the length of the body
- In Hawaii pest development is most rapid during July and August
- 17-52 day life cycle

Source: CTAHR Crop Knowledge Master

Cabbage Webworm (*Hellula undalis*)

- Infestations are not detected until plants appear stunted or deformed
- Look for silk webbing and frass
- Damage occurs throughout crop growth
  - Primary feeding damage on young, developing plants parts as webworms feed on growing terminals.
  - Bore into main stem and stalk, causing plants to wilt and die
  - Formation of multiple heads, deformation
  - Unmarketable crop


Photo: J. Sugano

Source: CTAHR Crop Knowledge Master

Cabbage Webworm Management

- Biological Control
  - Very little known about important parasitoids and predators
- Cultural Control
  - Screen seedlings before transplanting
  - Seedlings should be 5 or 6 inches high and good vigor
- Physical Control
  - Exclusion
- Chemical Control
  - Bt is only partially effective;

  Not recommended as standard treatments

Source: CTAHR Crop Knowledge Master

Comparing Physical Barriers and Organic Insecticides for Controlling Cabbage Webworm on Pak Choy

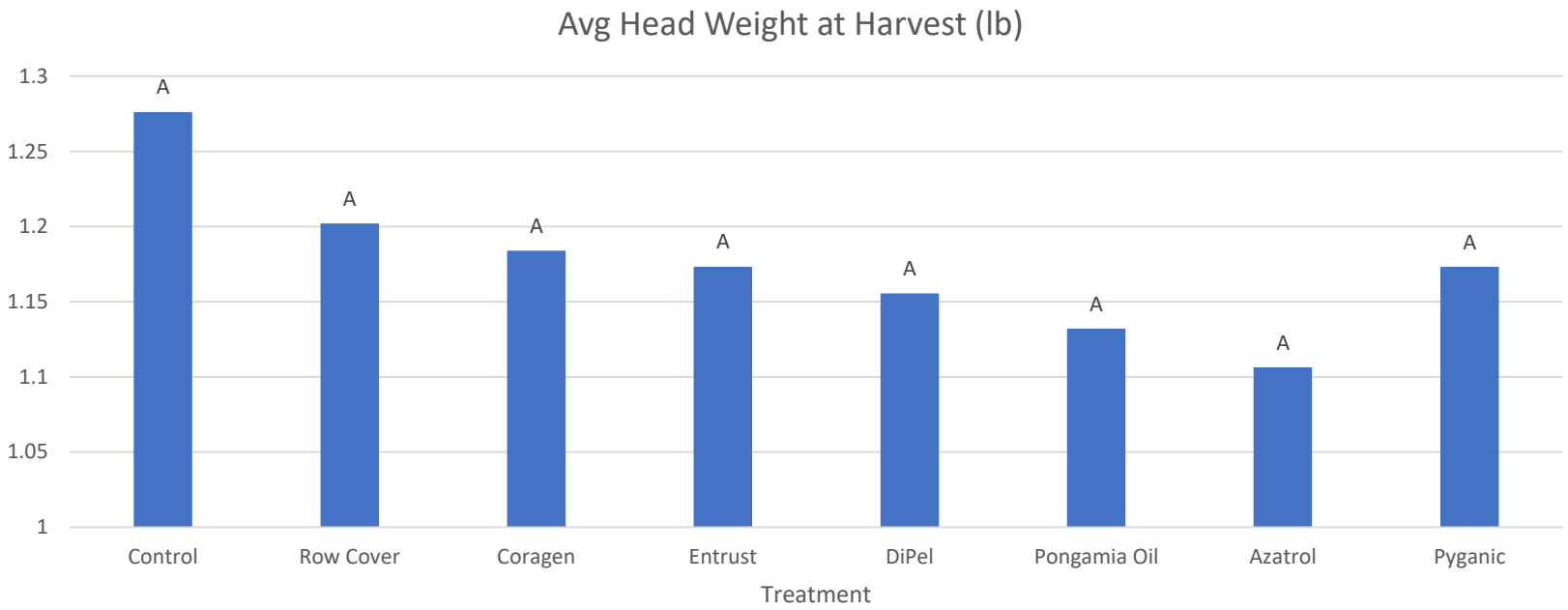
Objectives

- To rate efficacy of organic insecticides on webworm control, compared to a non-organic insecticide
- To evaluate the use of screen row covers for webworm control

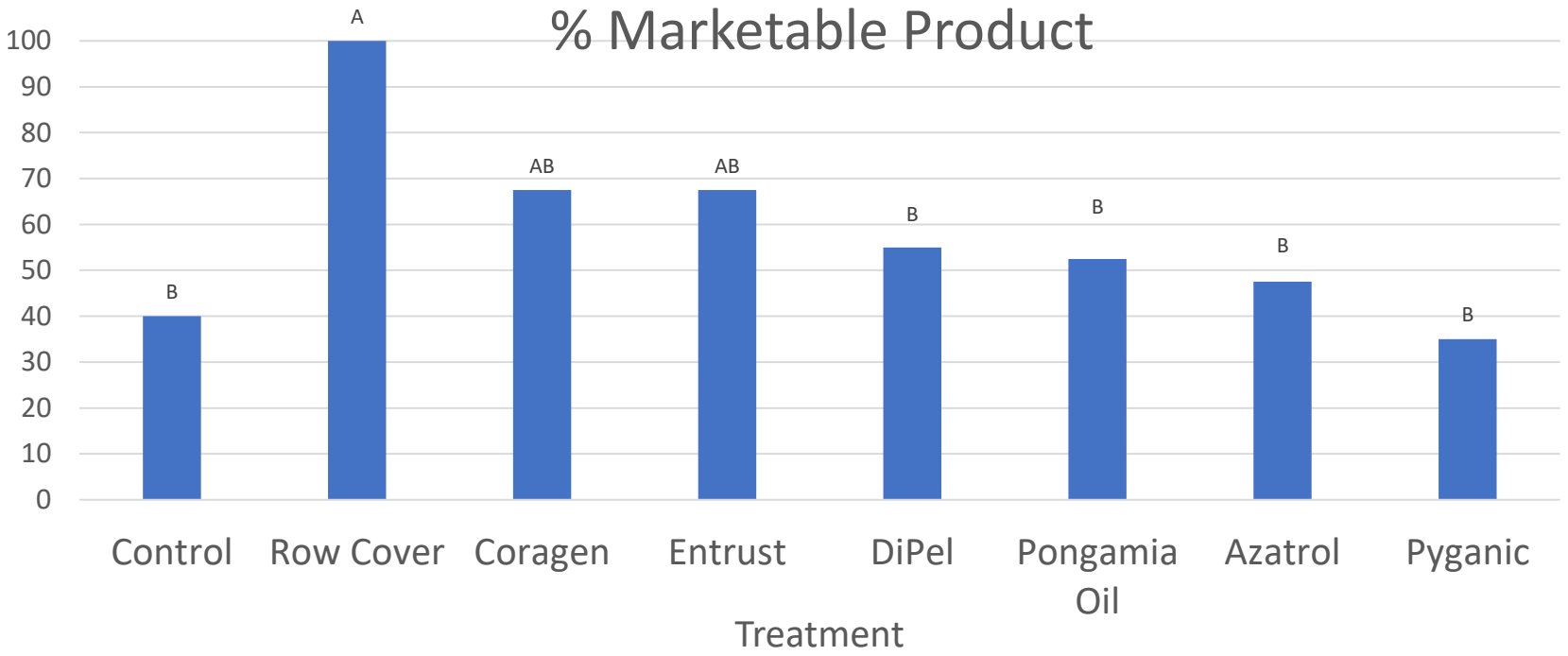
Treatments

Product Name	**Active Ingredient or Description**	**Rate Applied**
Neemix	4.5% Azadirachtin	10 fl. oz./ac
DiPel	*Bacillus thuringiensis* subsp. *kurstaki*	2.0 pints/ac
Enstrust SC	Spinosad	3 fl. oz./ac
Pyganic	Pyrethrin	15 ml/gal
Pongamia Horticultural Oil		2.0% (v/v)
Coragen (non-organic)	Chlorantraniliprole	3.5 fl. oz./ac
Proteknet “Biothrips” row netting + wire hoops	0.35mm x 0.35mm ; 89% light transmission, 62% porosity	n/a
Control	n/a	n/a

Results


Avg Head Weight at Harvest (lb)
1.3
1.25
1.2
1.15
1.1
1.05
1
A
A
A
A
A
A
A
A
Control
Row Cover
Coragen
Entrust
DiPel
Pongamia Oil
Azatrol
Pyganic
Treatment

Results


% Marketable Product
100
90
80
70
60
50
40
30
20
10
0
A
AB
AB
B
B
B
B
B
Control
Row Cover
Coragen
Entrust
DiPel
Pongamia Oil
Azatrol
Pyganic
Treatment

Considerations for Row Covers

- Proteknet Biothrips Screen
  - 0.35mm x 0.35mm
  - 89% light transmission
  - 62% porosity
  - $0.14/ft^2
- Wire Support Hoops
  - 26” wide, 16-18” high at center
  - #10 gauge galvanized steel
  - $122.00 per 100 pc.+ shipping

- Secure row covers to ground
- Minimize opening to prevent pest entry during crop growth

Bagrada bug (*Bagrada hilaris*)

Bagrada bug (*Bagrada hilaris*)

- Stink bug native to Africa; Found in HI on Maui in 2014
  - Found across the western US states
- Adults are black with orange and white markings
- Eggs laid in the soil beneath host plants—easy to mistakenly transport to uninfested areas
  - Also on leaves or hairy stems of host plants, mesh or row covers
- Nymphs are bright orange-red, may be confused with lady beetles
- 23 day life cycle

Photos: HDOA, S. Dara, E. Natwick

Source: HDOA, UC IPM

Photo: R. Shimabuku

Bagrada bug (*Bagrada hilaris*)

- Wide range of hosts, including various vegetable crops
  - Main hosts are brassica plants—crops and weeds
  - 2° hosts include various weeds and bell pepper, melon, papaya, tomato, cucumber, okra, sugarcane, potato and some legumes.
- Favor warm temperatures, activity increases in warmer periods
- Hide in soil or leaf litter in cooler temperatures

Photos: Western Farm Press, Univ. of CA

Source: HDOA, UC IPM

Preferred Host	Hosts
Chinese Cabbage	Head Cabbage
Mizuna	Head cabbage
Arugula	Daikon
Baby Pak Choi	Broccoli
	Cauliflower
	Kale
	Mustard greens
	Mustard cabbage
	Radish

2018 Host Preference Trial
Kula, Maui

- Sweet Alyssum
- Mustard Cover Crop

*Low population

Bagrada bug (*Bagrada hilaris*)

- Adults and nymphs feed on leaves, stems, flowers, and seeds
- Sucking mouth parts
- Starburst-shaped lesions on stems and leaves
- Stippled, wilted leaves, stunting, multiple heads or no head development

Bagrada bug (*Bagrada hilaris*) Management

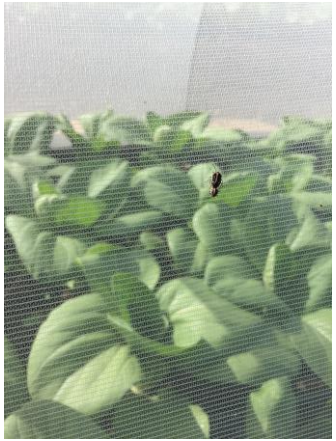
- Early detection is key—populations build quickly
- Monitor nearby weeds to prevent pest movement
- Monitor seedlings prior to planting
  - Inspect after watering seedlings
- Monitoring should occur in warmer months, and at warmer times of the day
  - Bagrada may be hiding under leaves, at bases of plants or in soil on cooler, cloudy days

Source: UC IPM

Bagrada bug (*Bagrada hilaris*) Management

- Cultural Control
  - Remove weed hosts in and near planting areas
  - Inspect seedlings before transplanting; treat seedlings
  - Remove crop residue after harvest
- Physical Control
  - Removal by hand—low populations only
  - Removal by vacuum?
  - Traps baited with crushed sweet alyssum?
- Chemical Control


Photo: UC IPM



Source: UC IPM

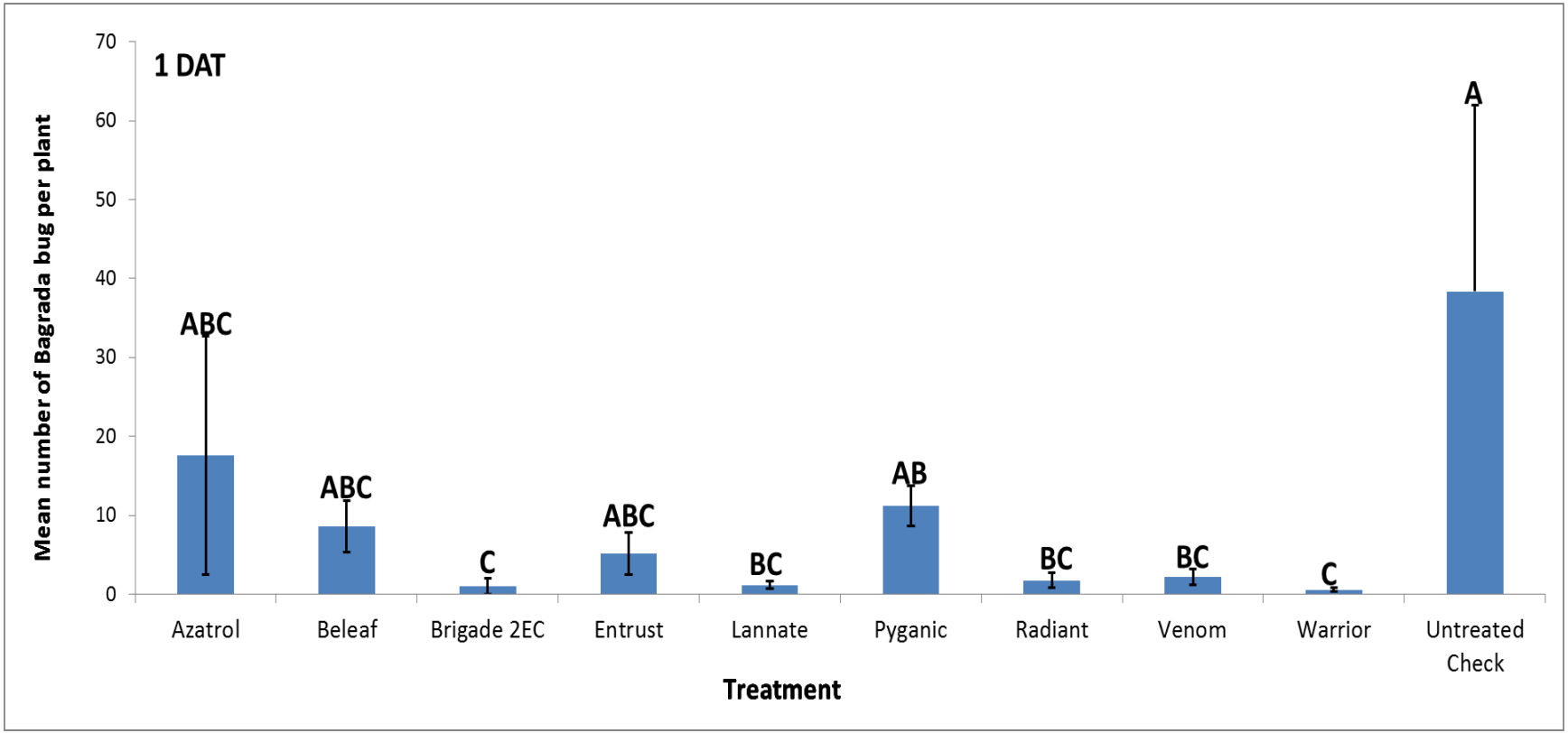
Insecticide Evaluations for Bagrada Bug on Cole Crops

December 2016 – January 2017

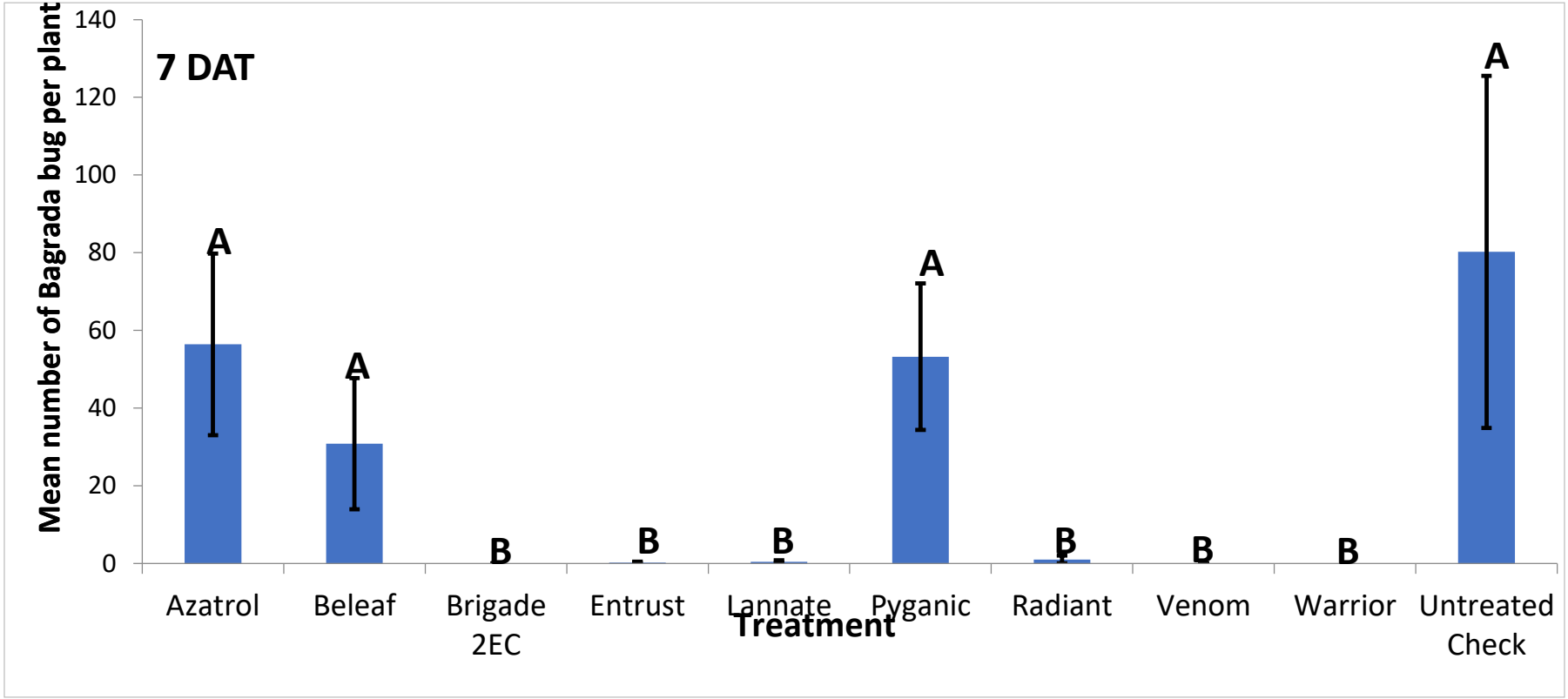
Robin Shimabuku, Dr. Ronald Mau, Kylie Wong, Dr. Ming Yi Chou

Insecticide	Chemical AI	MOA	Rate
Untreated Check	Water + surfactant		
Brigade – 2EC (Bifenthrin)	Pyrethroid	3	6.4 oz/A
Lannate SP (Methomyl)	Carbamate	1A	1.5 lbs/A
Warrior	Pyrethroid	3	3.84 fl.oz./A
Radiant	Spinetoram	5	10 fl.oz./A
Entrust SC	Spinosad	5	4 ozs/A
Venom	Neonicotinoid	4A	4 oz/A
Pyganic 5 EC	Pyrethrins	3	18 fl.oz/A
Beleaf	Flonicamid	9C	2.8 oz./A
Azadirect	Azadiractin	18B	3 pts/A

Bagrada knock down and control 1 day after treatment



Bagrada knock down and control 7 days after treatment



- The insecticides that effectively control Bagrada bug all have good residual activity 7 days after treatment

- Entrust performed best out of organic treatments

Upcoming work with bagrada bug

Objective: Provide options and recommendations for organic management

- Traps and trap crops (alyssum, mizuna?)
- Mechanical removal by vacuum
- Organic insecticide efficacy trial, including biologicals

Photo: S. Dara, Univ. of CA

Questions?