Efficacy of systemic insecticides to control the Hibiscus Bud Weevil

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Anthonomus testaceosquamosus (Coleoptera: Curculionidae)

Developing an IPM strategy

HBW adults can survive up to 30 days without food if water available, making it difficult to eliminate from the nurseries

Retailers restrict the use of neonicotinoids, while foliar applications have shown low efficacy

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Developing an IPM strategy

Need to explore options to control a hidden pest (i.e., development occurs in buds)

An IPM program needs to be developed in order to protect the industry and prevent further losses

Objectives

To test non-neonicotinoid, registered systemic insecticides, under greenhouse conditions

To evaluate two approaches, prior (prophylactic) and post (curative) infestation in relation to their articulation to an IPM program

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Materials and Methods

Five systemic insecticides registered for ornamentals under nursery production, using the label recommended rates

Insecticide	Group	Mode of action	Dosage
Kontos® Spirotetramat	23	Lipid synthesis	3.4 fl oz for 165 3-gall pots
Altus® Flupyradifurone	4D	Nicotine acetylcholine receptors	28 fl oz/750 gal
Mainspring® cyantraniliprole	28	Muscular Calcium channels	12.2 fl oz/100 gal
Acelepryn® chlorantraniliprole	28	Muscular Calcium channels	16 fl oz/100 gal
Water	-		-

- Painted lady plants individually caged, N = 6 per treatment
- Greenhouse conditions (77± 2°F; 70% ± 10% RH)
- Four weevils per cage (2f, 2m)
- 500 ml solution/pot

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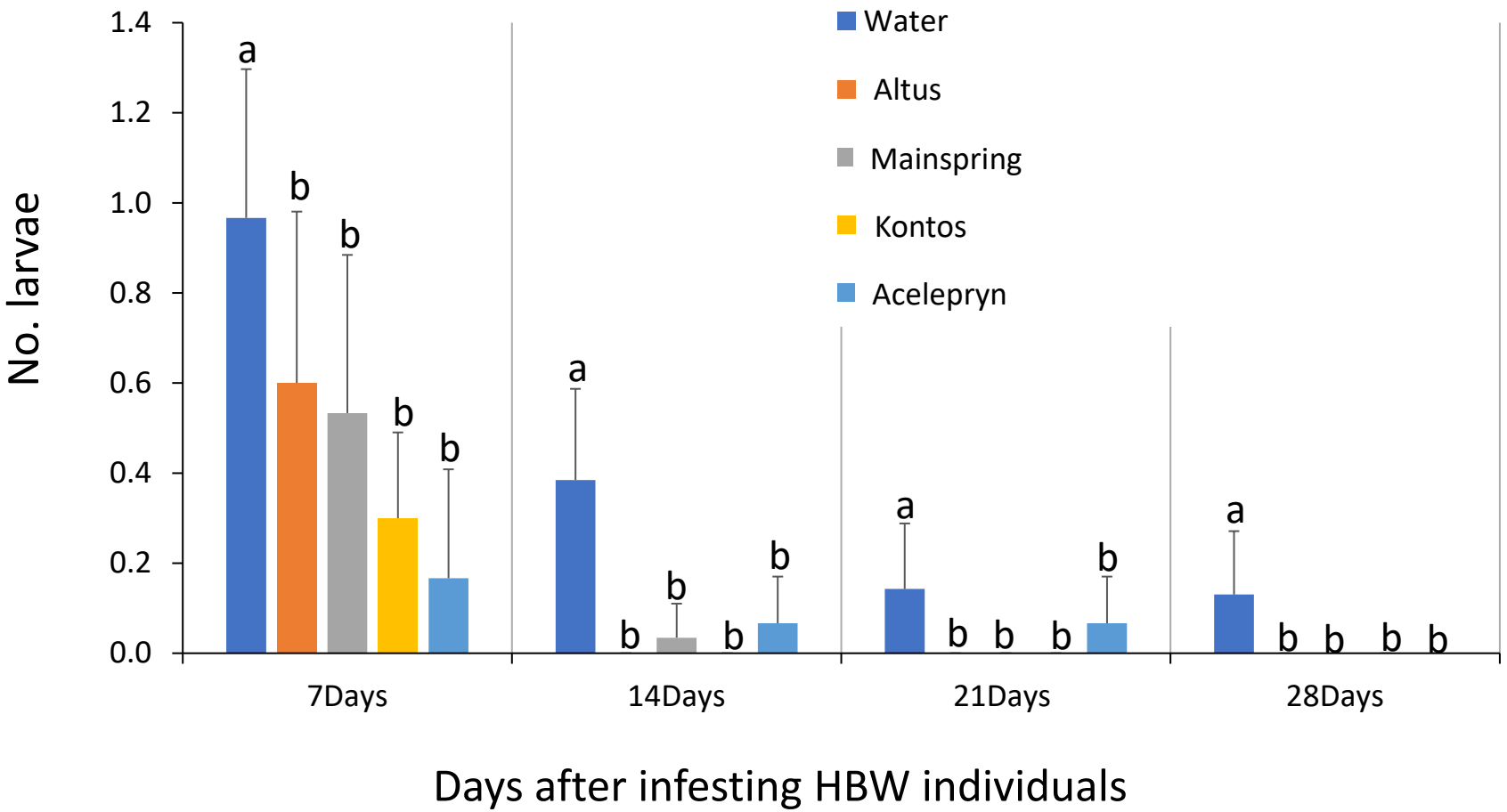
Prophylactic Approach

Plants drenched 4 weeks prior to weevil release

Observations 7, 14, 21, and 28 days after weevil release

In each observation, 5 buds per plant were taken and fallen buds were collected. Counts of number of eggs, larvae, pupae and feeding holes per bud

Mean number of live larvae per bud



– Prophylactic
plants drenched 4 weeks prior to weevil release

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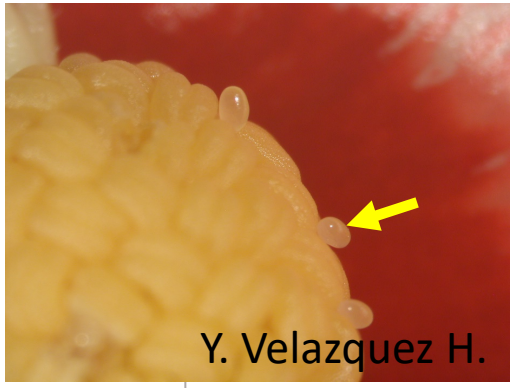
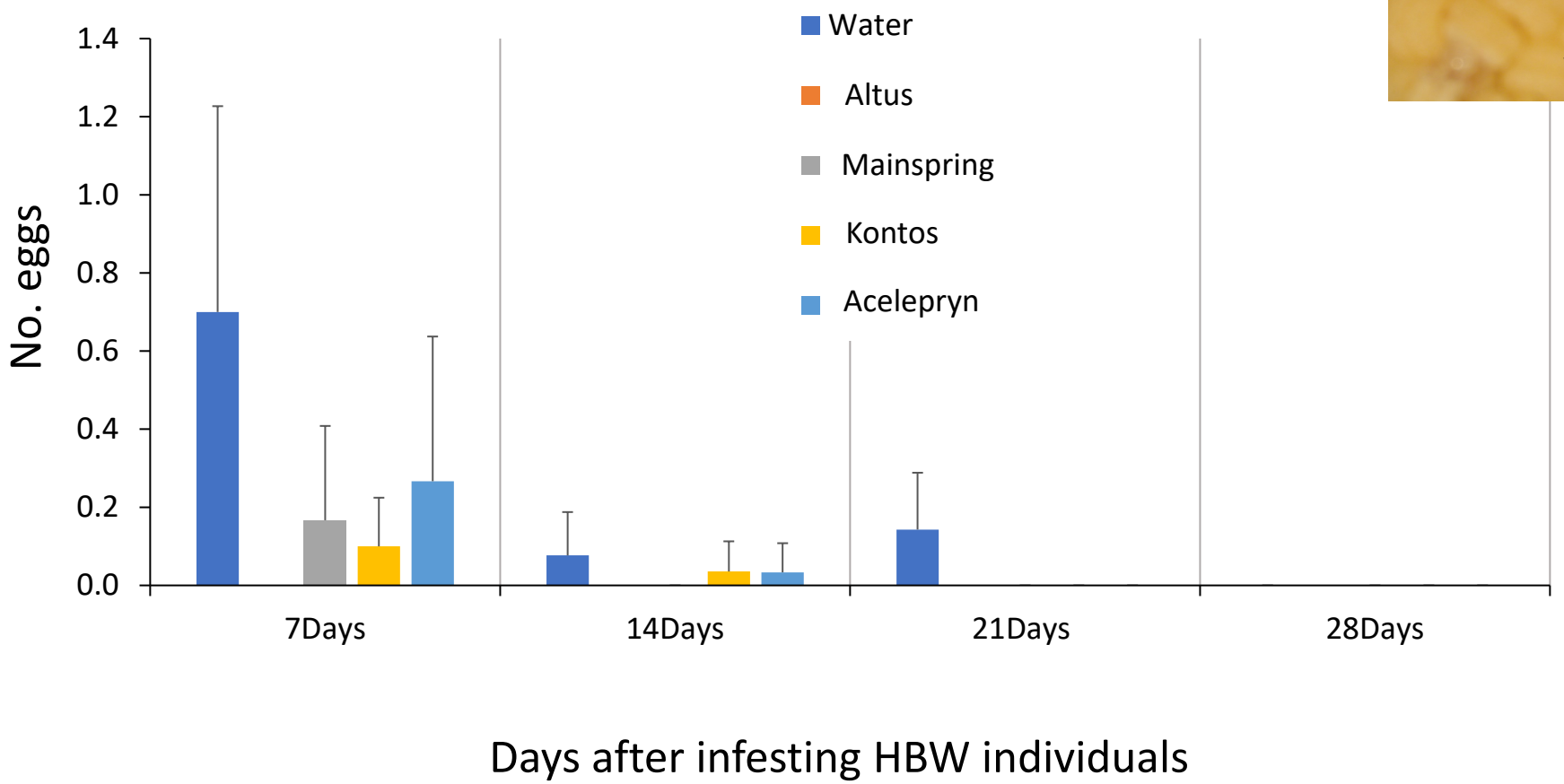
Mean number of eggs per bud





– Prophylactic
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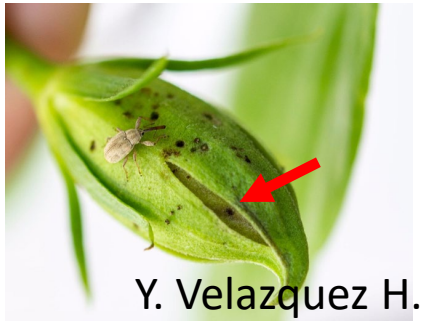
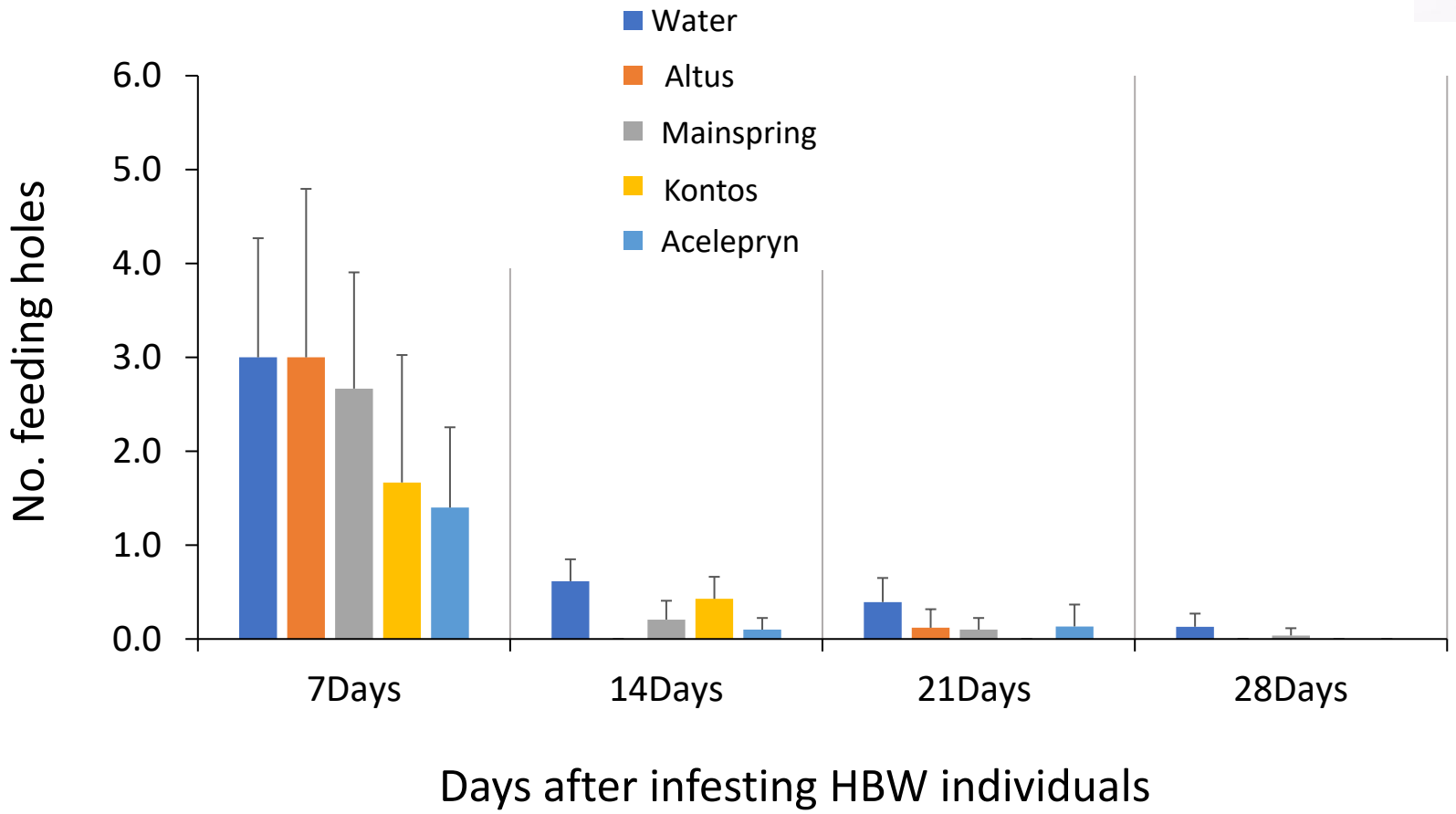
Mean number of feeding holes per bud





– Prophylactic
plants drenched 4 weeks prior to weevil release

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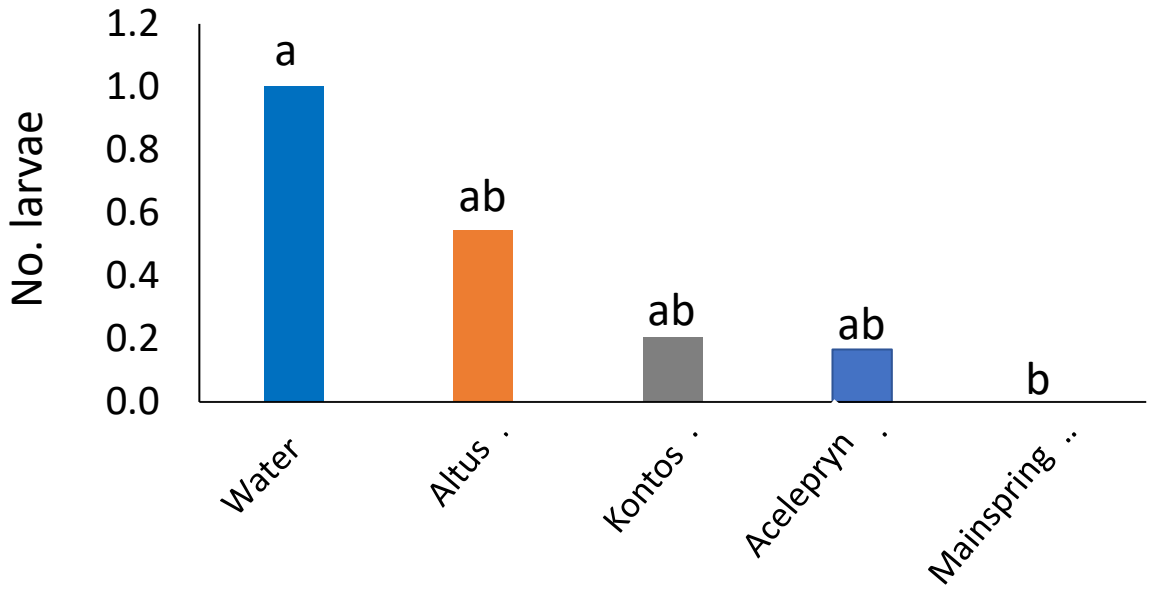
Alive larvae in fallen buds (pool)



– Prophylactic
plants drenched 4 weeks prior to weevil release

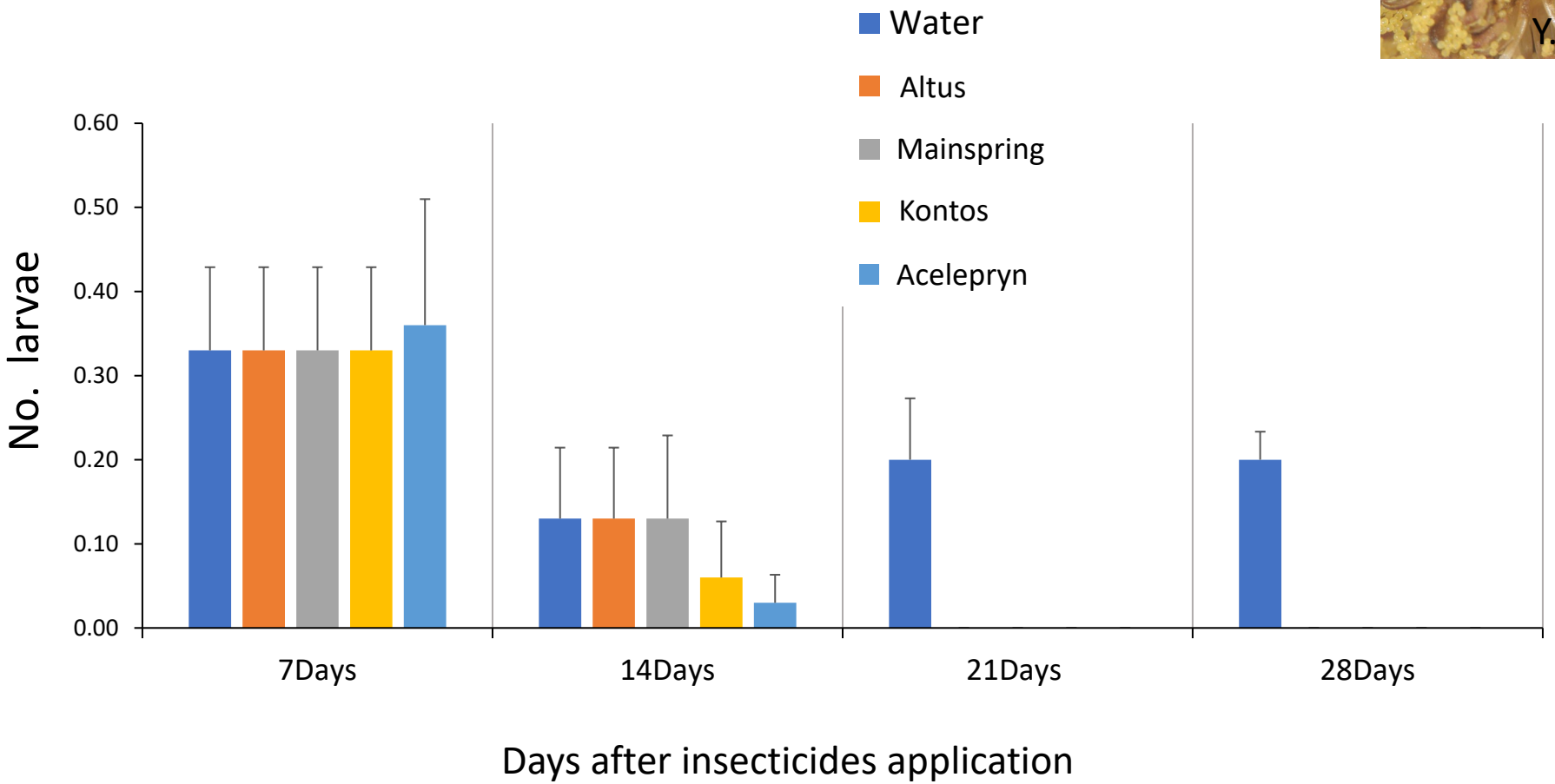
Curative Approach

Weevils were released, then after 1-week plants were drenched

Observations 7, 14, 21, and 28 days after insecticides application

In each observation, 5 buds per plant were taken and fallen buds were collected. Counts of number of eggs, larvae, pupae and feeding holes per bud

Mean number of live larvae per bud



– Curative
plants drenched 1 week post weevil release

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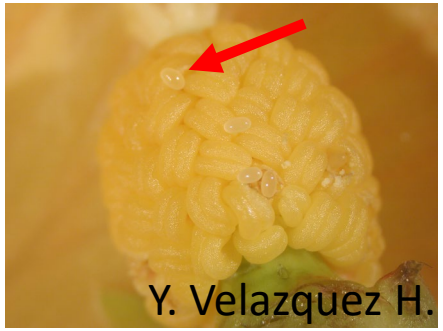
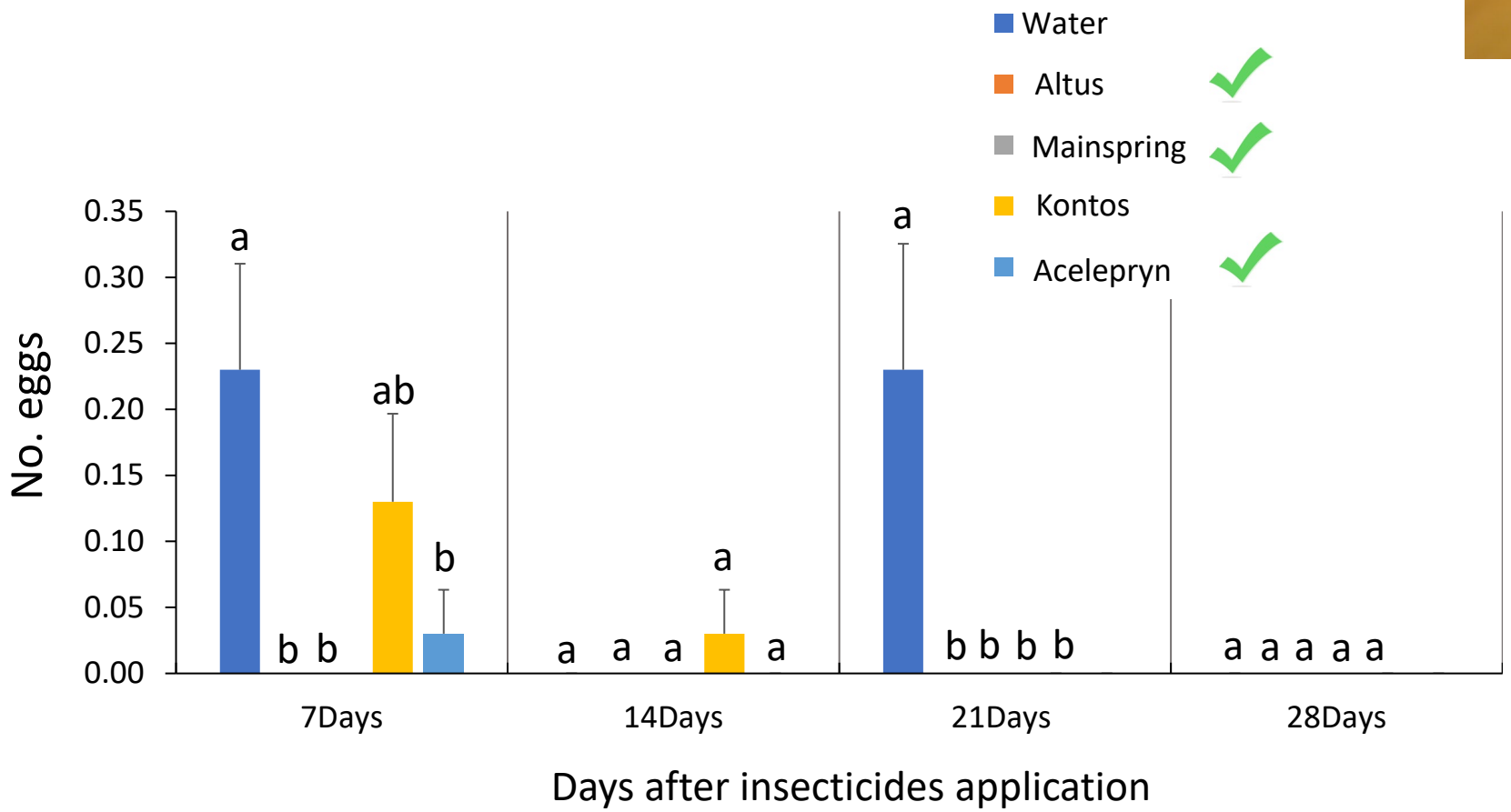
Mean number of eggs per bud





– Curative
plants drenched 1 week post weevil release

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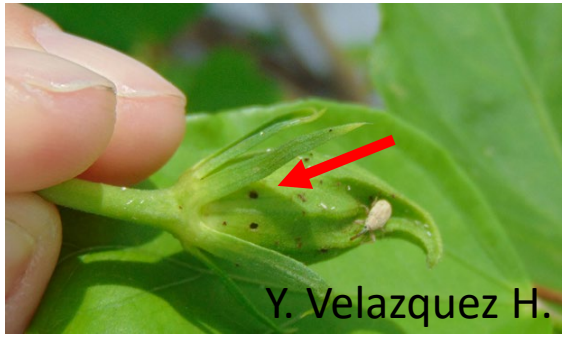
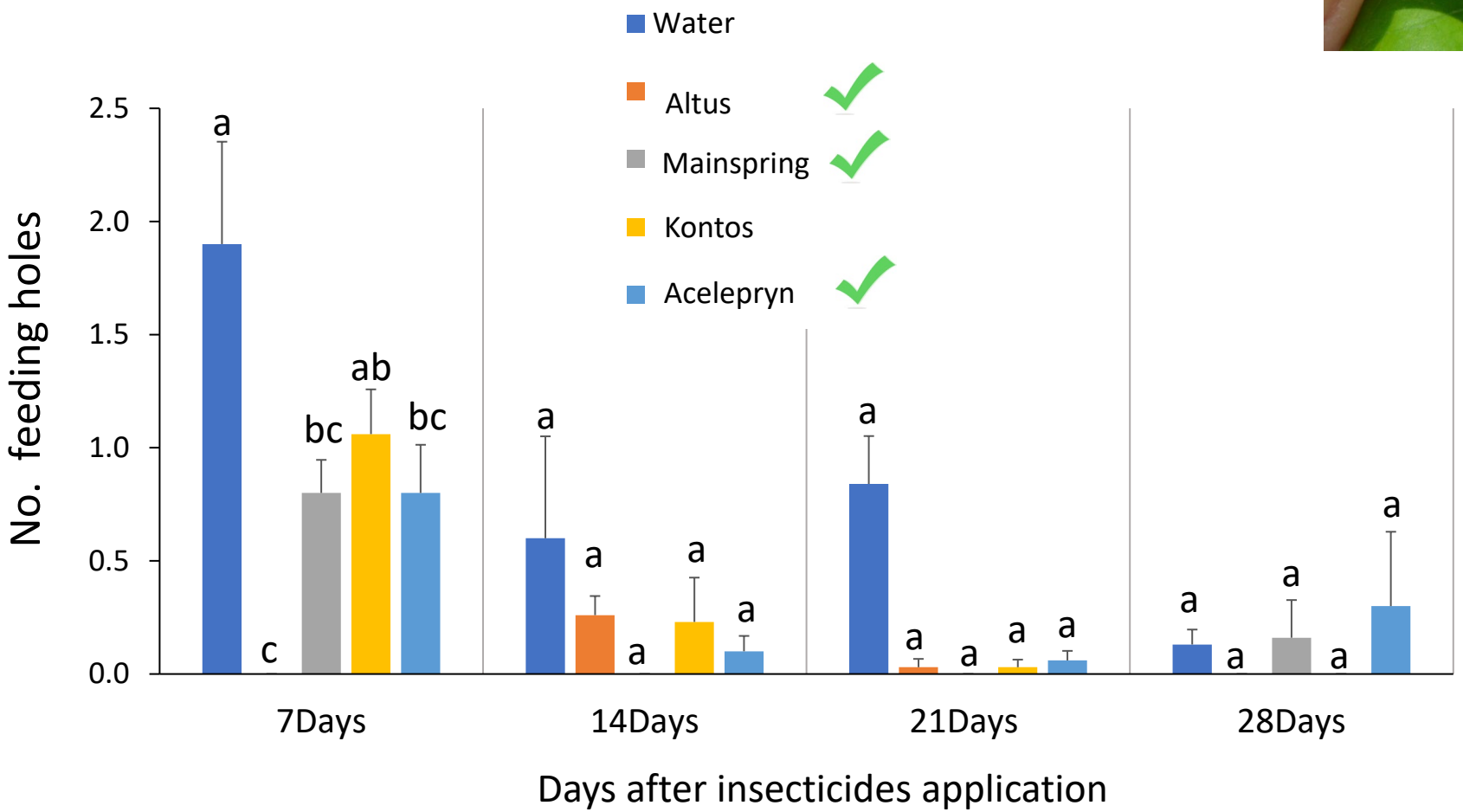
Mean number of feeding holes per bud





– Curative
plants drenched 1 week post weevil release

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In summary …

	No. Larvae	No. Eggs	No. Holes	In fallen buds	
				No. Holes	No. Larvae
Prophylactic plants were drenched 4 weeks prior to weevil release	*	ns	ns	ns	*
Curative plants were drenched 1 week post weevil release	ns	*	*	ns	ns

In the prophylactic, females laid eggs, but larvae were reduced, even in dropped buds.

In the curative, reduction in the number of feeding holes and eggs are the result of adults being killed/repelled after plants were drenched. However, no control was observed on fallen buds.

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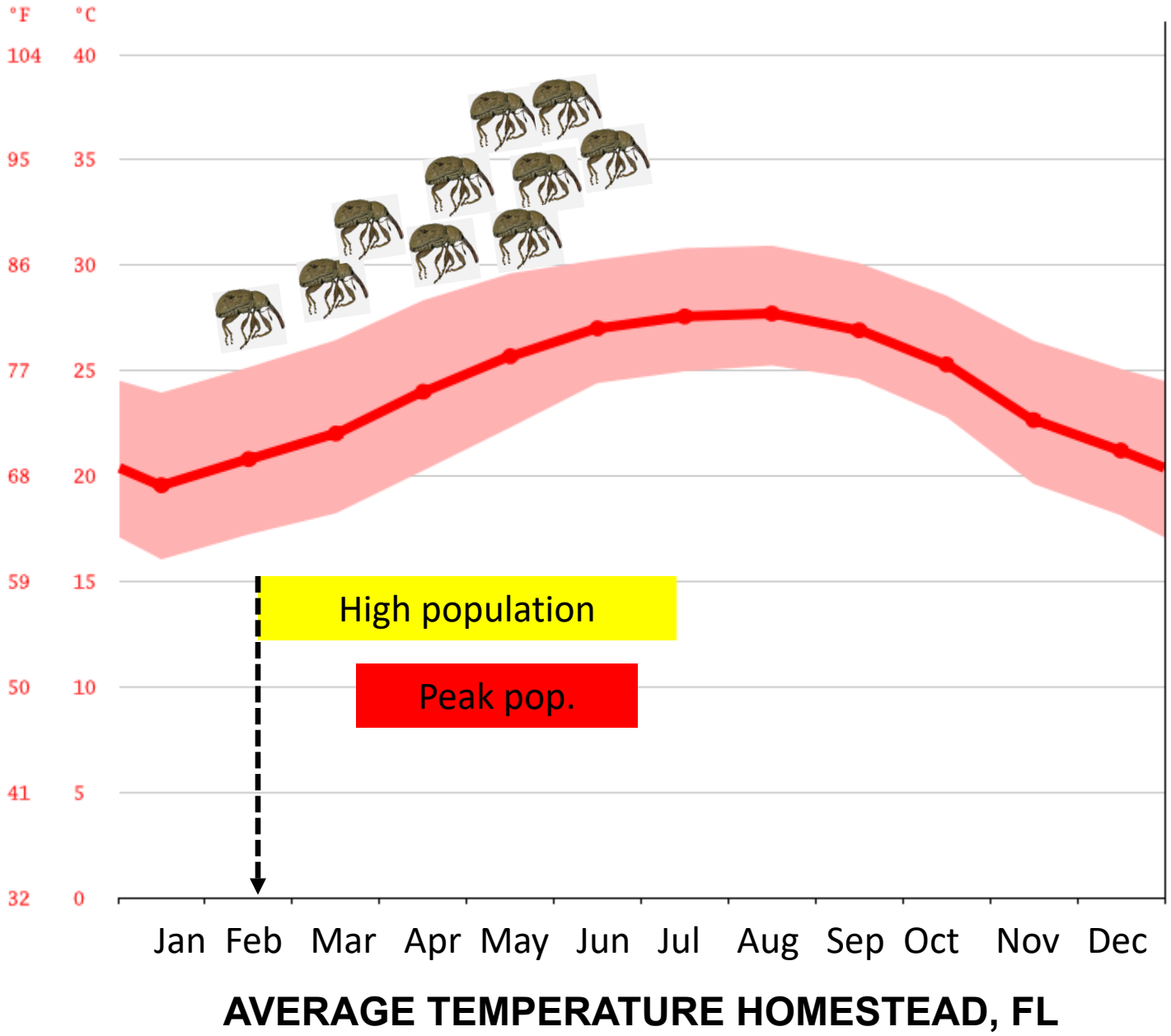
Considering phenology towards an IPM program

HBD low populations Aug. to Jan.
HBW HIGH POPULATIONS between Feb. and Jul. – Peak March to June

Systemics under a prophylactic approach since February would delay weevil's colonization (need to adjust sampling procedures)

Then, use of foliar entomopathogenic nematodes and/or fungi (others?) would help in sustaining the population down

Use of contact insecticides before the shipping period would prevent dissemination



https://en.climate-data.org/north-america/united-states-of-america/florida/homestead-1632/#temperature-graph

Summary

Systemic insecticides used via drench showed reduction in the number of larvae, number of eggs and number of feeding holes in the buds under greenhouse conditions

Mainspring, Acelepryn and Altus exhibited the best results in both approaches

A prophylactic approach could enhance an IPM program, as it shows effects on fallen buds, a likely critical aspect of pest population dynamics, giving chance to other alternatives to sustain populations down (i.e., biological, repellents, others) – need to adjust sampling procedures

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To consider …

$$$ Mainspring and Acelepryn

$ Altus

✓ Rotation of modes of action, so to avoid resistance

Altus has demonstrated problems with honeybees **if** used over the recommended rate

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Thank you!