Contact Insecticides Against The Hibiscus Bud Weevil

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USDA

NATIONAL HORTICULTURE FOUNDATION

Building an IPM for the HBW

- It is challenging!
- Requires research and time
- We aim at:
  - developing monitoring tools
  - identify good biocontrol agents
  - optimize the use of chemical control

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Contact Insecticides Against the HBW

- Can cause mortality:
  - direct contact
  - feeding
- Can decrease oviposition
- Target adult weevils!
- Foliar application

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In this Workshop

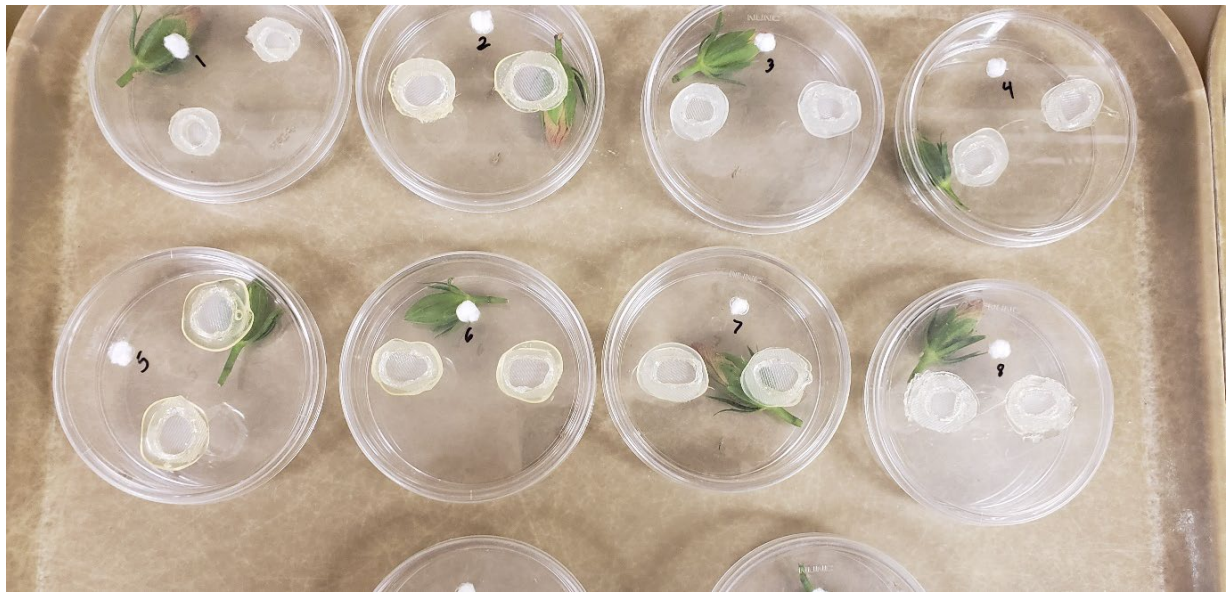
- We will not present results on:
  - products that are not available in the market or difficult to find i.e., Dursban (chlorpyrifos)
  - products that are banned by retailers, i.e., neonicotinoids (4A)

Experimental Set-up 1

- Hibiscus ‘Painted Lady’ with buds were sprayed with the insecticide
- Control plants were sprayed with water
- After the insecticide dried, buds and leaves were removed and placed in petri dishes separately
- Two adults were placed in each petri dish (N = 10 pairs per treatment)
- Adult mortality was evaluated at 4, 24, 48, 72, and 96 hrs. after application

Tested Insecticides

Product	Active Ingredient	Group	Rate
Sevin	carbaryl	1A	1 qt/100 gal
Acephate	acephate	1B	12 oz/100 gal
Imidan 70 W	phosmet	1B	1 lbs/100 gal
Pyganic EC	pyrethrins	3A	15.61 fl oz/100 gal
Mavrik Aquaflow	tau-fluvalinate	3A	10 fl oz/100 gal
Talstar P	bifenthrin	3A	21.7 fl oz/100 gal
Decathlon	cyfluthrin	3A	1.9 oz/100 gal
Scimitar GC	lambda-cyhalothrin	3A	5 fl oz/100 gal
Xxpire	sulfoxaflor+spinetoram	4C + 5	0.08 oz/3 gal
Conserve SC	spinosad	5	0.06 fl oz/gal
Timectin	abamectin	6	2.5 oz/ gal
Dimilin 25 W	diflubenzuron	15	16 oz/100 gal
Hatchi-Hatchi SC	tolfenpyrad	21A	27 fl oz/100 gal
Kontos	spirotetramat	23	0.1 fl oz/3 gal
Mainspring GNL	cyantraniliprole	28	8 fl oz/100 gal
Acelepryn	chlorantraniliprole	28	16 fl oz/100 gal
AzaSol	azadirachtin	Unknown	6 oz/50 gal
Stylet	paraffinic oil	Unclassified	2 fl oz/ gal
Ultrafine	paraffinic oil	Unclassified	2%
Agropest	thyme + rosemary oil	Unclassified	0.5%
SuffoilX	mineral oil	Unclassified	2%



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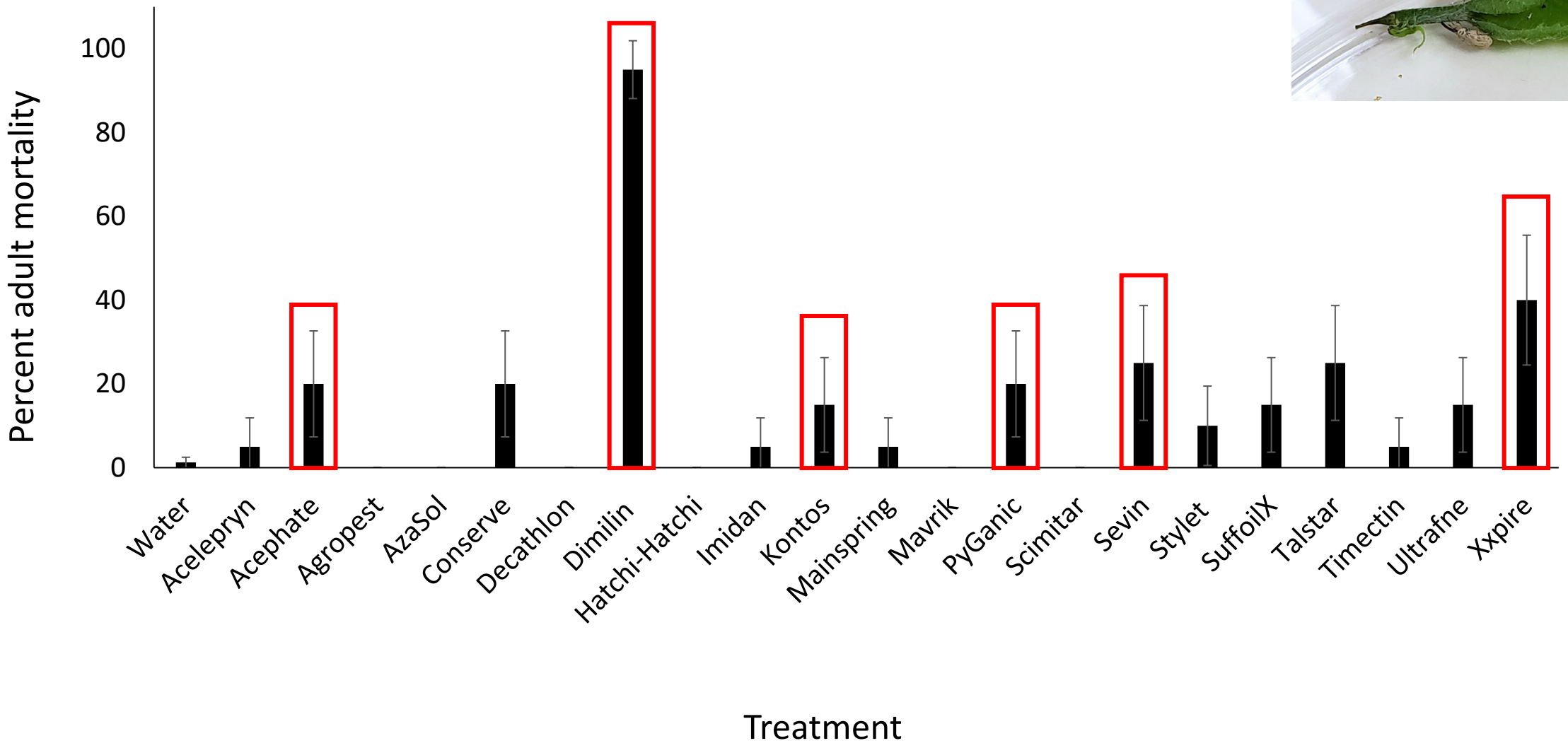
Mortality on Buds

Mortality on Leaves

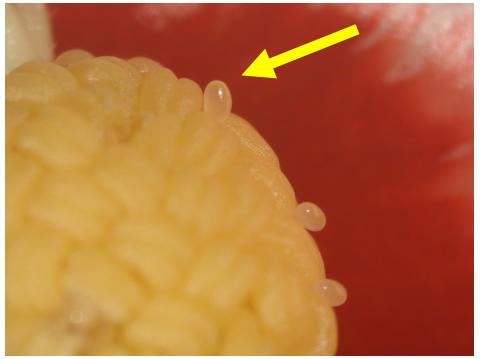


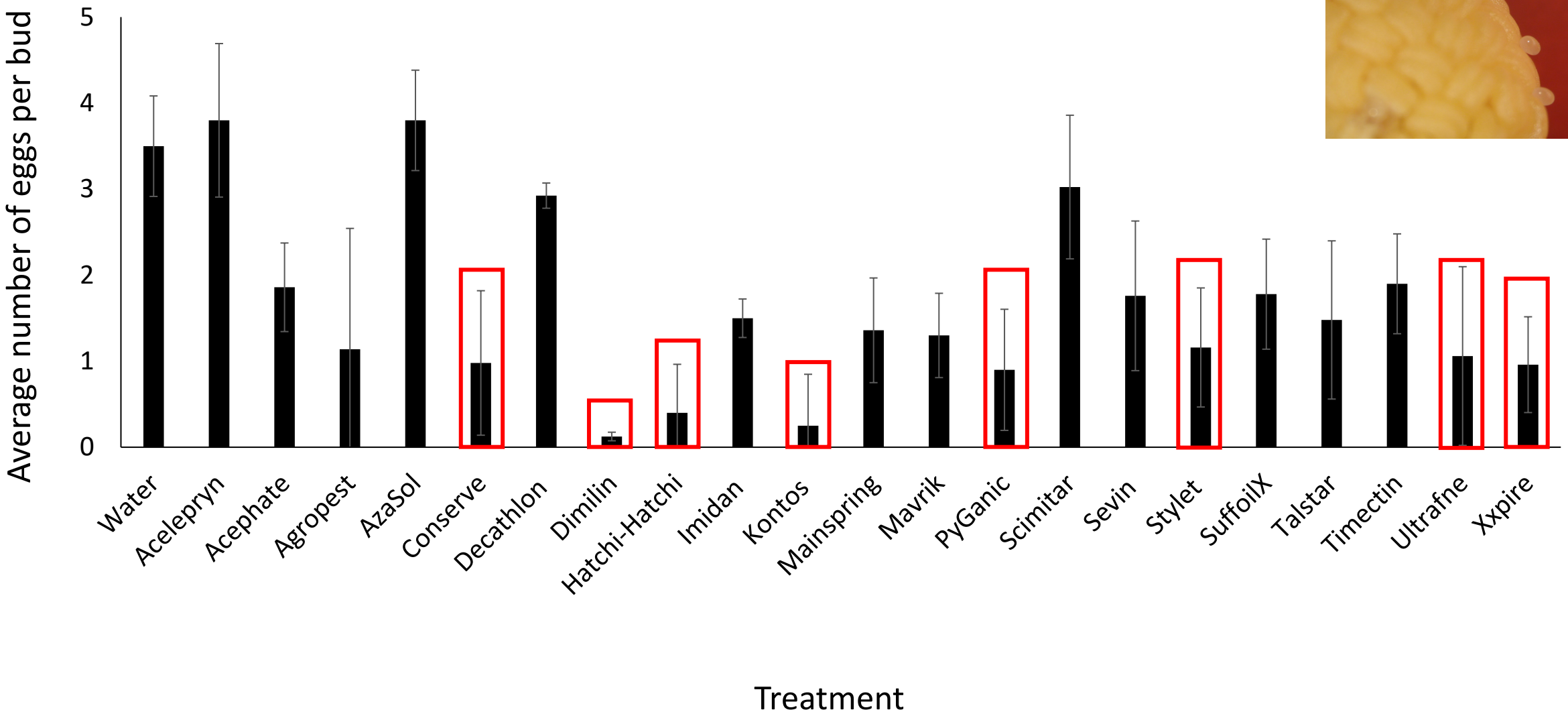
Experimental Set-up 2

- Hibiscus ‘Painted Lady’ with buds were sprayed with the insecticide
- Control plants were sprayed with water
- After the insecticide dried, buds were removed and placed in petri dishes separately
- Two adults were placed in each petri dish (N = 10 pairs per treatment)
- Every 24 h the buds were replaced with new ones from the sprayed plants
- Adult mortality, feeding holes and eggs were scored at 24, 48, 72, and 96 hrs. after application

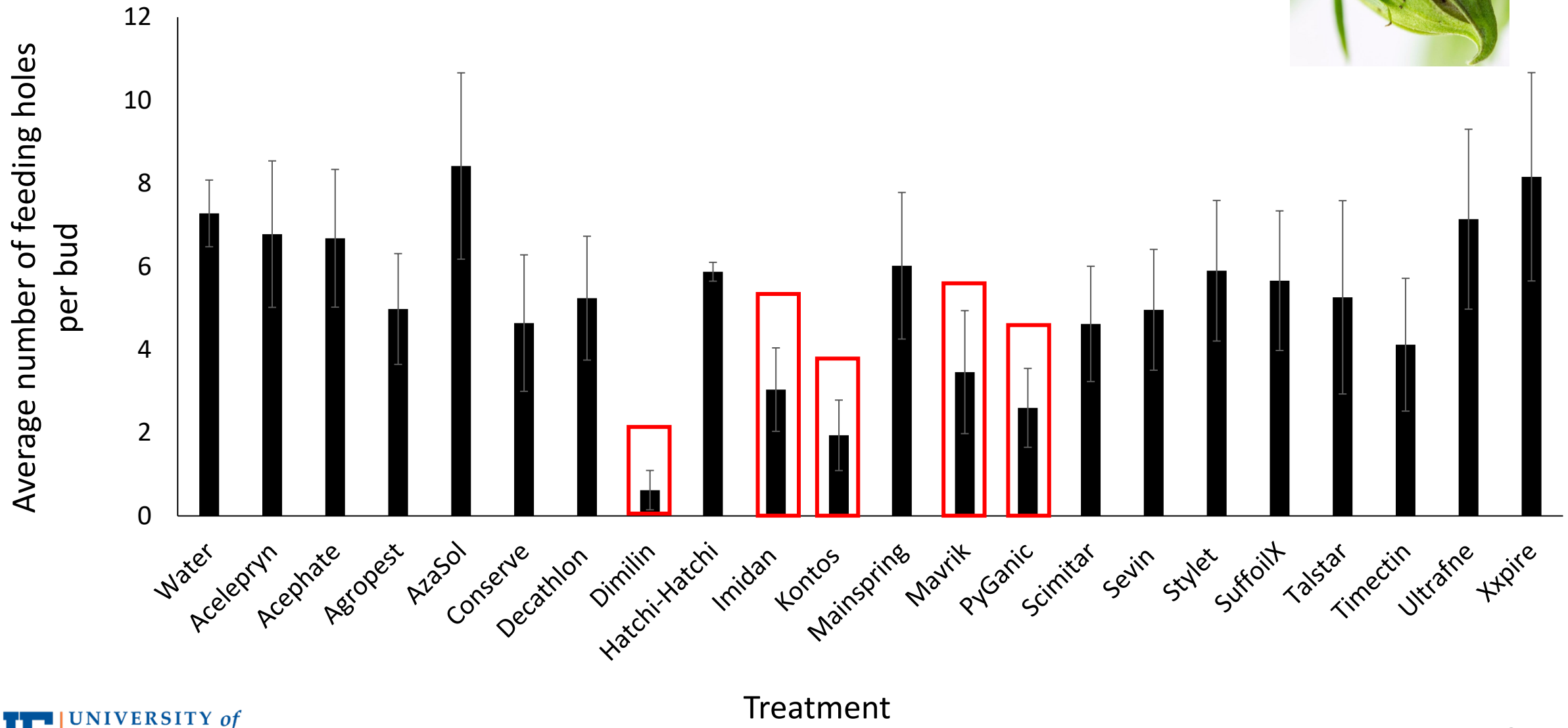
Mortality on Buds (Residuals)

Eggs per Bud




Average number of eggs per bud
0
1
2
3
4
5
Water
Acelepryn
Acephate
Agropest
AzaSol
Conserve
Decathlon
Dimilin
Hatchi-Hatchi
Imidan
Kontos
Mainspring
Mavrik
PyGanic
Scimitar
Sevin
Stylet
SuffoilX
Talstar
Timectin
Ultrafne
Xxpire
Treatment

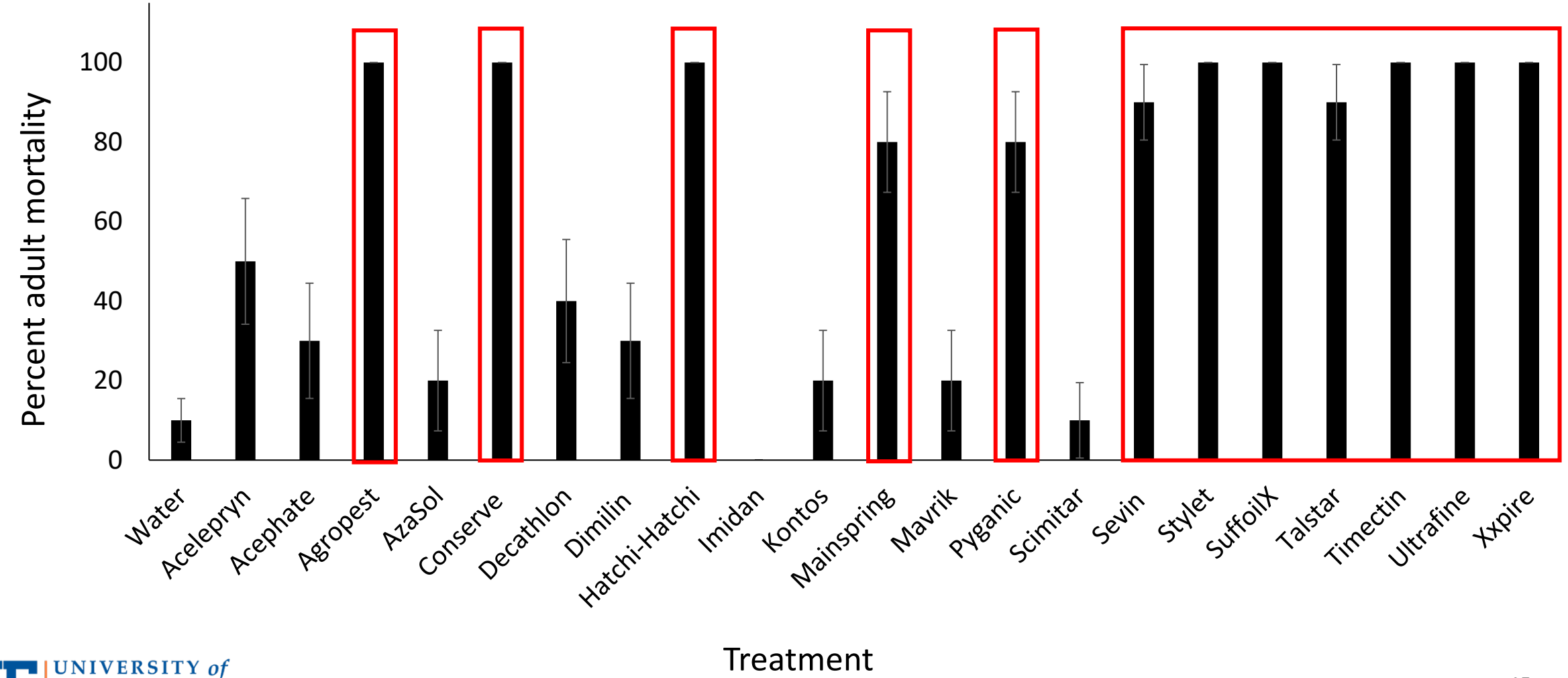
Feeding Holes per Bud



Experimental Set-up 3

- Individual weevils (males and females) were isolated in petri dishes with filter paper
- 1 ml of insecticide or water was applied directly on each weevil
- Adult mortality was evaluated at 24, 48, 72, and 96 hrs. after application
- N = 10 for each treatment

Mortality by Direct Contact



Treatment	Mortality buds
Dimilin 25 W	X
Xxpire	X
Pyganic EC	X

Treatment	Mortality buds	Mortality leaves
Dimilin 25 W	X	X
Xxpire	X	X
Pyganic EC	X	X
Kontos		X
Acephate		X
Sevin		X

Treatment	Mortality buds	Mortality leaves	Mortality buds residuals
Dimilin 25 W	X	X	X
Xxpire	X	X	
Pyganic EC	X	X	
Kontos		X	X
Acephate		X	
Sevin		X	
Ultrafine			X

Treatment	Mortality buds	Mortality leaves	Mortality buds residuals	Eggs
Dimilin 25 W	X	X	X	X
Xxpire	X	X		X
Pyganic EC	X	X		X
Kontos		X	X	X
Acephate		X		
Sevin		X		
Ultrafine			X	X
Conserve SC				X
Hatchi-Hatchi SC				X
Stylet				X

Treatment	Mortality buds	Mortality leaves	Mortality buds residuals	Eggs	Feeding holes
Dimilin 25 W	X	X	X	X	X
Xxpire	X	X		X	
Pyganic EC	X	X		X	X
Kontos		X	X	X	X
Acephate		X			
Sevin		X			
Ultrafine			X	X	
Conserve SC				X	
Hatchi-Hatchi SC				X	
Stylet				X	
Imidan 70 W					X
Mavrik Aquaflow					X

Treatment	Mortality buds	Mortality leaves	Mortality buds residuals	Eggs	Feeding holes	Direct
Dimilin 25 W	X	X	X	X	X	
Xxpire	X	X		X		X
Pyganic EC	X	X		X	X	X
Kontos		X	X	X	X	
Acephate		X				
Sevin		X				X
Ultrafine			X	X		X
Conserve SC				X		X
Hatchi-Hatchi SC				X		X
Stylet				X		X
Imidan 70 W					X	
Mavrik Aquaflow					X	
Agropest						X
Mainspring GNL						X
SuffoilX						X
Talstar P						X
Timectin						X

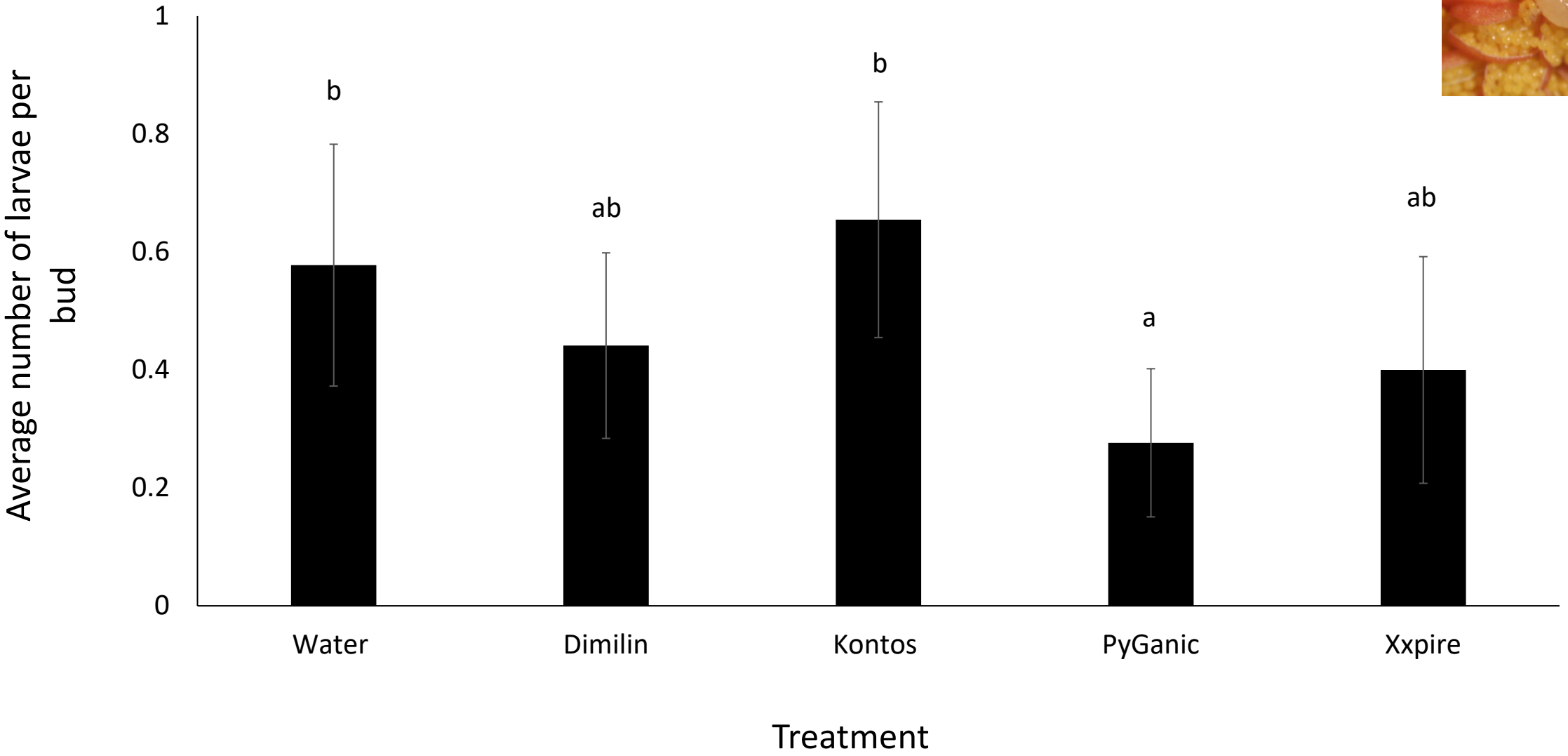
Treatment	Group	Mortality buds	Mortality leaves	Mortality buds residuals	Eggs	Feeding holes	Direct
Dimilin 25 W	15	X	X	X	X	X	
Xxpire	4C+5	X	X		X		X
Pyganic EC	3A	X	X		X	X	X
Kontos	23		X	X	X	X	
Acephate	1B		X				
Sevin	1A		X				X
Ultrafine	Unclassified			X	X		X
Conserve SC	5				X		X
Hatchi-Hatchi SC	21A				X		X
Stylet	Unclassified				X		X
Imidan 70 W	1B					X	
Mavrik Aquaflow	3A					X	
Agropest	Unclassified						X
Mainspring GNL	28						X
SuffoilX	Unclassified						X
Talstar P	3A						X
Timectin	6						X

Greenhouse Experiment

- 30 hibiscus ‘Painted lady’ were individually caged
- Groups of 6 plants were assigned a treatment
- 2 females and 2 males were released in each cage 1 week prior to spray
- One week after weevil release the plants were sprayed to runoff with Xxpire, Dimilin, Kontos, Pyganic or water
- 5 hibiscus buds were sampled from each cage 24h, 4 and 7d after the spray application
- 19 days after the initial application a second spray application was made
- 5 hibiscus buds were sampled from each cage 9d after the second spray application
- The number of larvae, feeding holes and eggs on each bud were scored

Photos: Y. Velazquez & G. Vargas

Larvae per Bud



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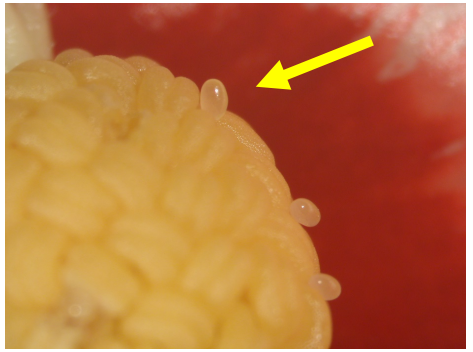
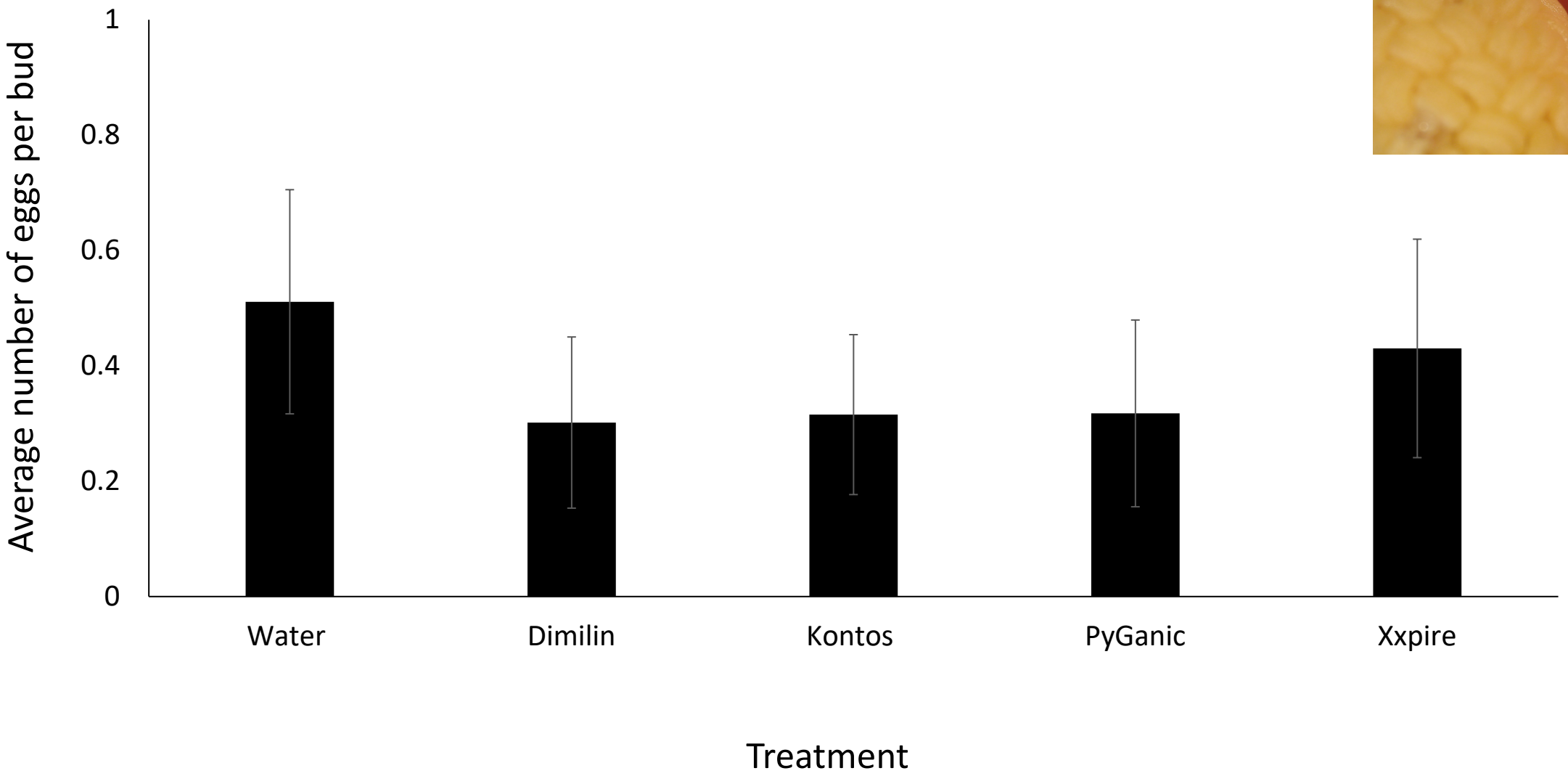
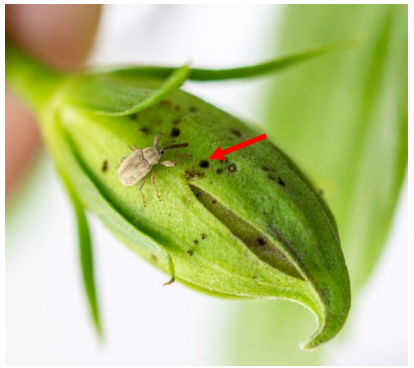
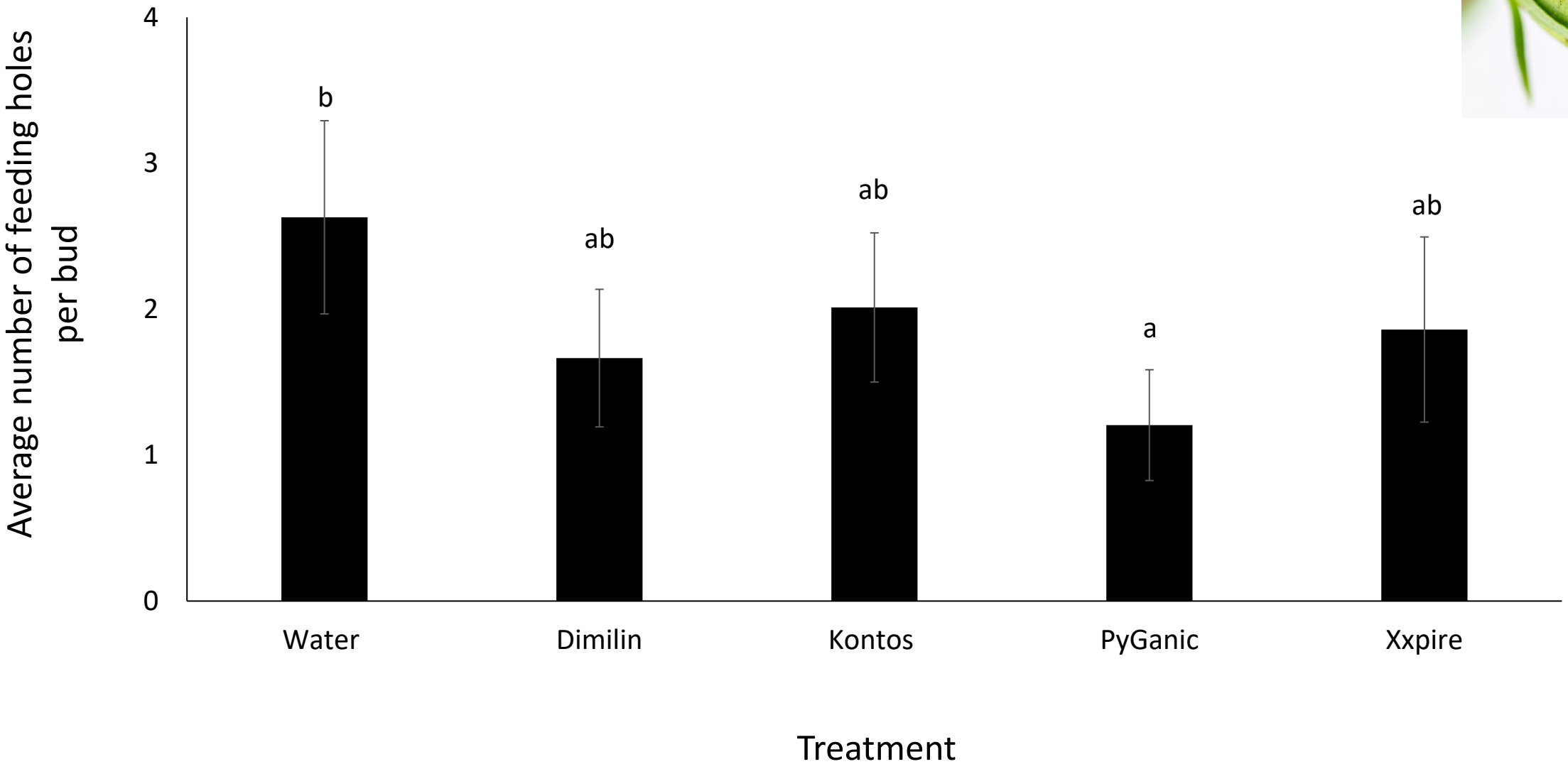
Eggs per Bud




Average number of eggs per bud
1
0.8
0.6
0.4
0.2
0
Water
Dimilin
Kontos
PyGanic
Xxpire
Treatment

Feeding Holes per Bud





Take-home messages

- There is no silver bullet!
- Insecticides can provide control in various ways
- Horticultural oils have good potential
- ROTATE insectides from different groups to avoid RESISTANCE!

Future Research

- Toxicological studies – USDA-ARS collaboration with Dr. Xiangbing Yang
- Design a rotation program that is compatible with biocontrol
- Evaluate essential oils against HBW – USDA-ARS collaboration with Dr. Nurhayat Tabanca

Thank you!

Jose Alegria

Florida Nursery and Landscape Association

Miami-Dade County Agricultural Manager's Office

Hibiscus Bud Weevil Task Force

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