Efficacy of Newer Insecticides against Invasive Species in Hawaii

Crop Protection Services Seminar

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What will this presentation cover?

PESTS:

myoporum & chilli thrips, anthurium thrips, whitefly, little fire ant, papaya mealbugs, root mealybugs, melon aphid.

*Insecticides:

- Pyrethroid (Talstar)
- Neonicotinoids (Merit, Safari, Optgard, TriStar, Arena)
- Organophosphate (Precise = acephate)
- Tetronic Acid (Kontos = spirotetramat)
- Feeding Blocker (Aria = flonicamid)
- Ryanodine receptor (Acelepryn = chlorantraniliprole)

*Ant Baits:

- Probait (hydromethylnon)
- Extinguish Professional (methoprene)
- Extinguish Plus (hydramethynon plus methoprene)
- Advion (Indoxicarb)
- Maxforce Complete (hydramethylnon)

*Resistance Management

Control of Myoporum Thrips, *Klambothrips myopori*

Based on trials in California

Bethke and Shaw (UC CES)

- The minute pirate bug, *Orius* sp., a thrips predator, has controlled the myporum thrips in CA and will also impact thrips in HI.
- Avoid broad-spectrum insecticides that impact these predators.
- Conserve reduced thrips numbers and damage in CA.
- Avid did not reduce thrips numbers as much as Conserve or Merit.
- The neonicotinoids, Merit and Safari, have shown to be effective.
- Merit results have not been consistent and negatively impacted the pirate bugs in CA.
- Talstar works well as a preventative treatment according to landscapers, but will negatively impact the pirate bugs.
- Suggested treatments are Safari drench and Conserve foliar application.

Myoporum Thrips Infestation at Maunalani “Kamilo”

← Before Talstar application

ca. 3 weeks after Talstar application →

Chilli thrips, *Scirtothrips dorsalis*

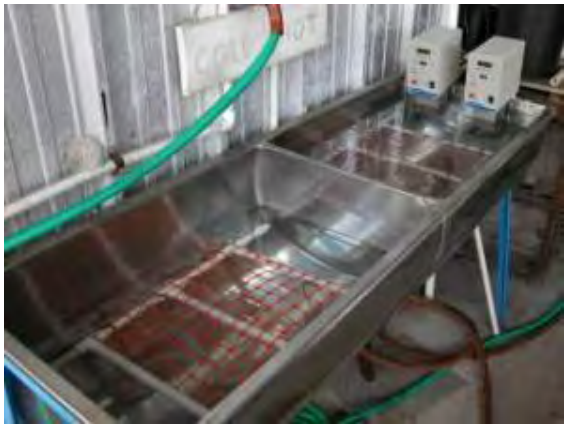
Chlorfenapyr (Pylon) was the most effective in reducing the densities of *S. dorsalis* adults and larvae, followed by spinosad (Conserve) and imidacloprid (Merit). The performance of other insecticides in controlling *S. dorsalis* populations was inconsistent (Seal et al. 2006).

Incorporating bifenthrin G into media for little fire ant control.

Potting plants with Talstar incorporated in media.

Trial demonstrated bifenthrin (Talstar) G was very effective.

Hot Water Against Little Fire Ant

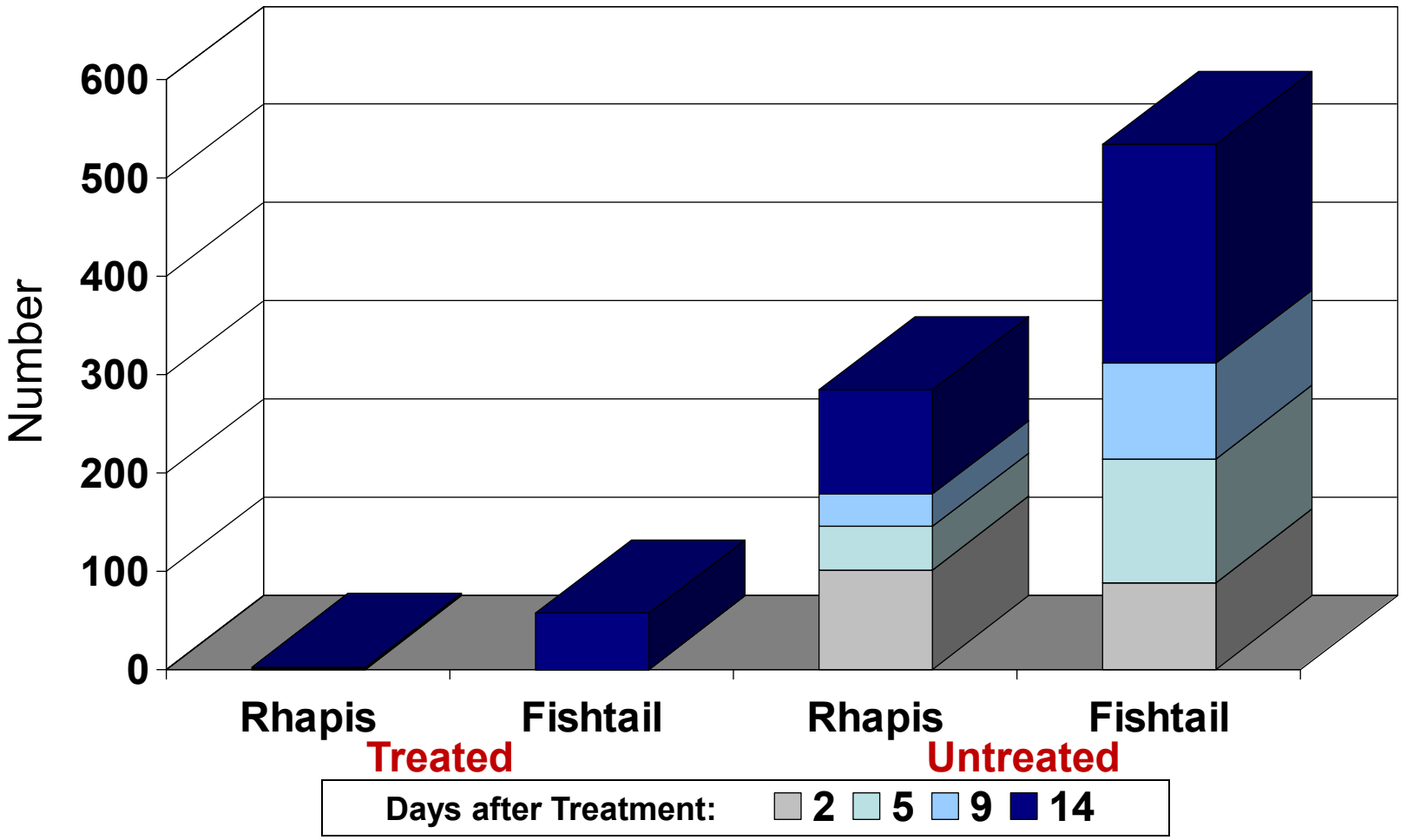


Hot water dip tank

Screened dish with over 300 ants

- Workers of LFA were effectively killed at 113 F for 10 min.
- Test conducted at a nursery on potted palms drenched at 114 F for 11 min.
- A tank-less gas water heater and pump provided the hot water drench.

Live Little Fire Ants Recovered After Hot Water Drench of Potted Palm Plants at 114°F for 11 min



*Little fire ants reduced by 99.3 and 89.3% in rhapis and fishtail, respectively.

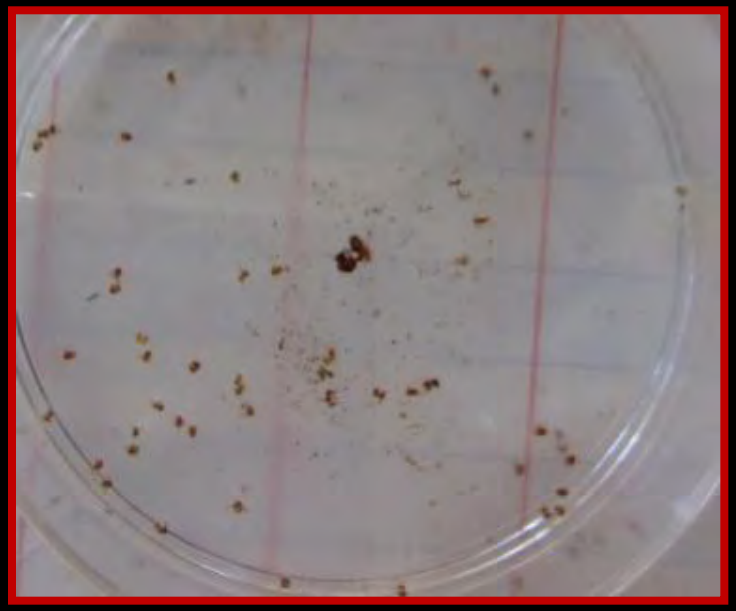
Little Fire Ant Control

- Extinguish Plus and Probait/Amdro (hydramethylnon) are most effective.
- Esteem (pyriproxyfen) is labeled for tropical fruit crops.
- Aerial colonies in trees are difficult to control (bait must be in trees).
- Tango (methoprene) mixed with vegetable oil and xanthum gum (emulsifier and thickener) can be applied in trees (Vanderwoude).
- Talstar granular and liquid are effective as a residual barrier treatment.
- Termidor (fipronil, PCO only) for building perimeter is effective.

Untreated

Extinguish Plus

(0.365% hydramethylnon & **0.25**% S-methoprene)



Nest Activity 7 WAT

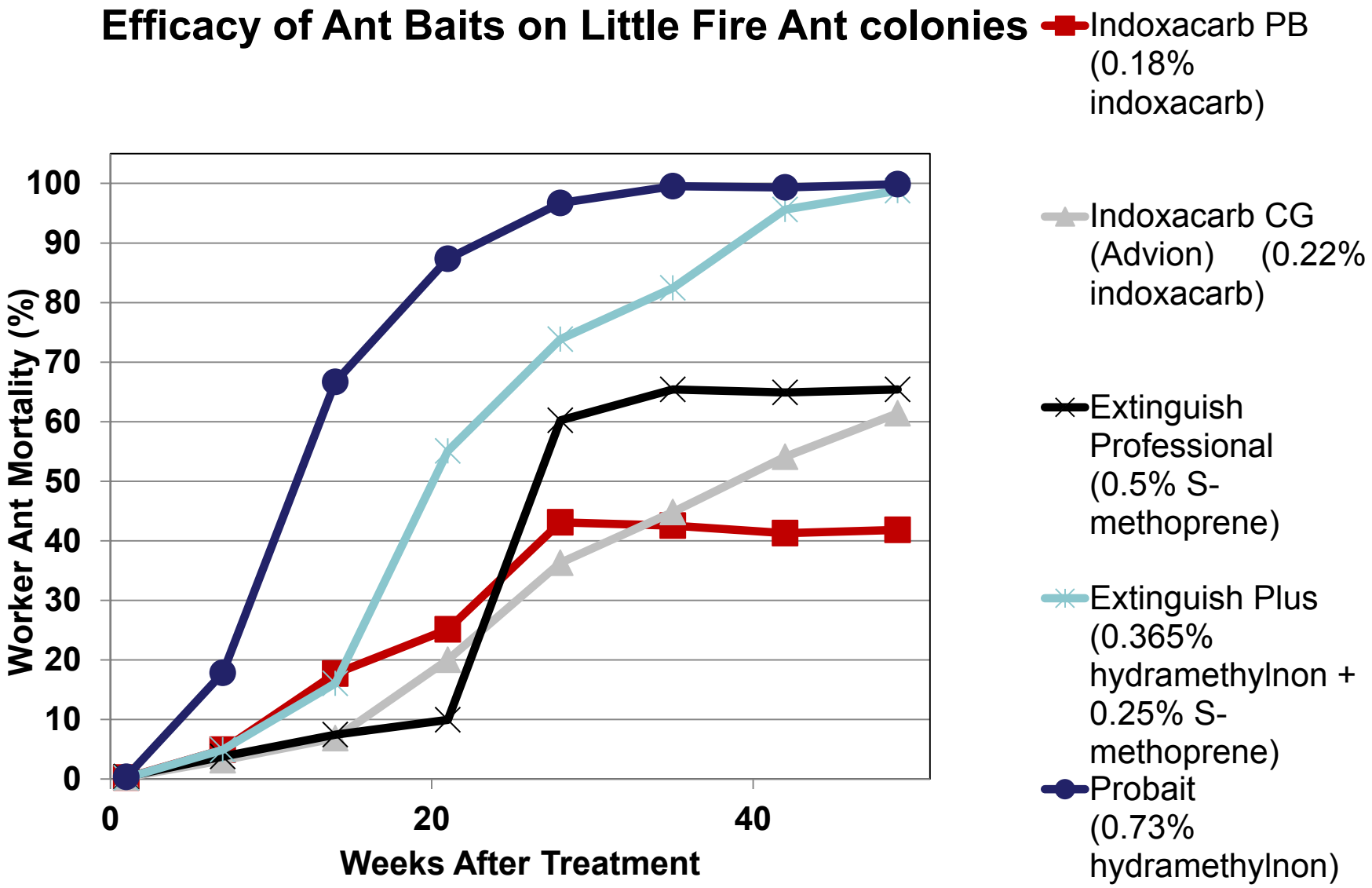
LFA attraction to peanut butter, Probait, Extinguish Plus & Professional

Peanut butter

Probait

Extinguish Plus

Extinguish Professional


Efficacy of Ant Baits on Little Fire Ant colonies
Worker Ant Mortality (%)
100
90
80
70
60
50
40
30
20
10
0
0
20
40
Weeks After Treatment
Indoxacarb PB (0.18% indoxacarb)
Indoxacarb CG (Advion) (0.22% indoxacarb)
Extinguish Professional (0.5% S-methoprene)
Extinguish Plus (0.365% hydramethylnon + 0.25% S-methoprene)
Probait (0.73% hydramethylnon)

Active Ingredients:
1.00% Hydramethylnon, similar AI to Amdro and Probait

Maxforce complete granules contain a bait matrix of sugars, proteins (including silk worm pupae), carbohydrates, fats, and oil, which accommodate insects' changing tastes and nutritional needs.

Maxforce® Complete Brand Granular Insect Bait is a ready-to-use product for use indoors and outdoors and around buildings, on lawns, and other non-crop areas* such as residential areas, the non-food/non-feed areas of institutional and commercial establishments including warehouses, restaurants, food processing plants, supermarkets, hospitals, nursing homes, motels, hotels, apartment, buildings, schools, laboratories, computer facilities, pet shops, zoos, sewers, highway rights-of-way and medians, traffic islands, utility rights-of-way (including power lines, pipelines, aqueducts) managed turf areas (non-crop*) (including school yards, playgrounds, athletic fields, amusement parks, picnic areas, recreation areas, office parks, industrial grounds, airports, shopping centers, public parks, arboretums, public gardens, monument sites, cemeteries and mausoleums, golf courses, race tracks, fairgrounds, outdoor amphitheaters, sod farms, and ornamental nurseries)

Little Fire Ant Infestation at UH-Hilo Instructional Farm

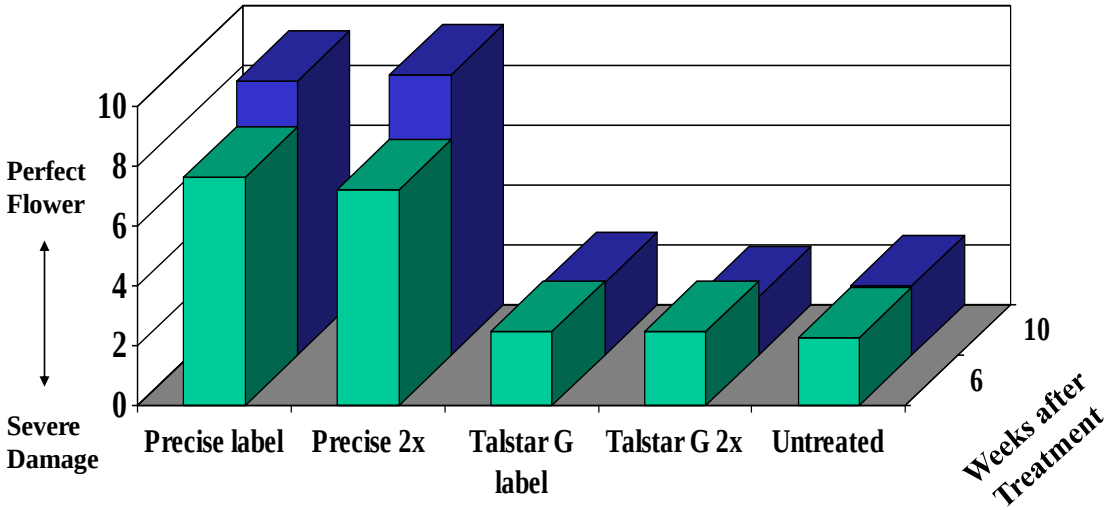
1 Hour after placement

Control (Peanut Butter) | Maxforce Complete | Probait

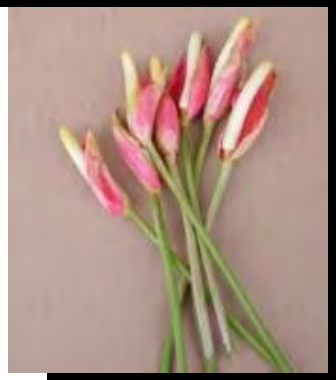
2 Hours after placement

Control (Peanut Butter) | Maxforce Complete | Probait

- Precise contains 4% acephate in a controlled release ammonium sulfate carrier.
- In other studies Precise has demonstrated systemic activity in plants for up to 180 days

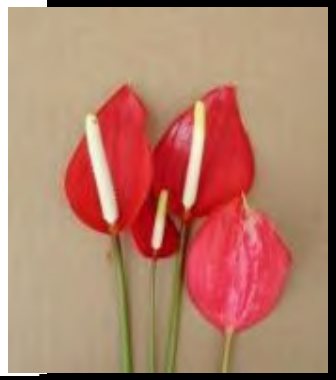


One application of Precise (acephate) resulted in greatly improved flower quality ($P<0.0005$) by reducing thrips feeding damage. Talstar G was not effective when applied to the media of potted anthuriums.



Talstar

Untreated



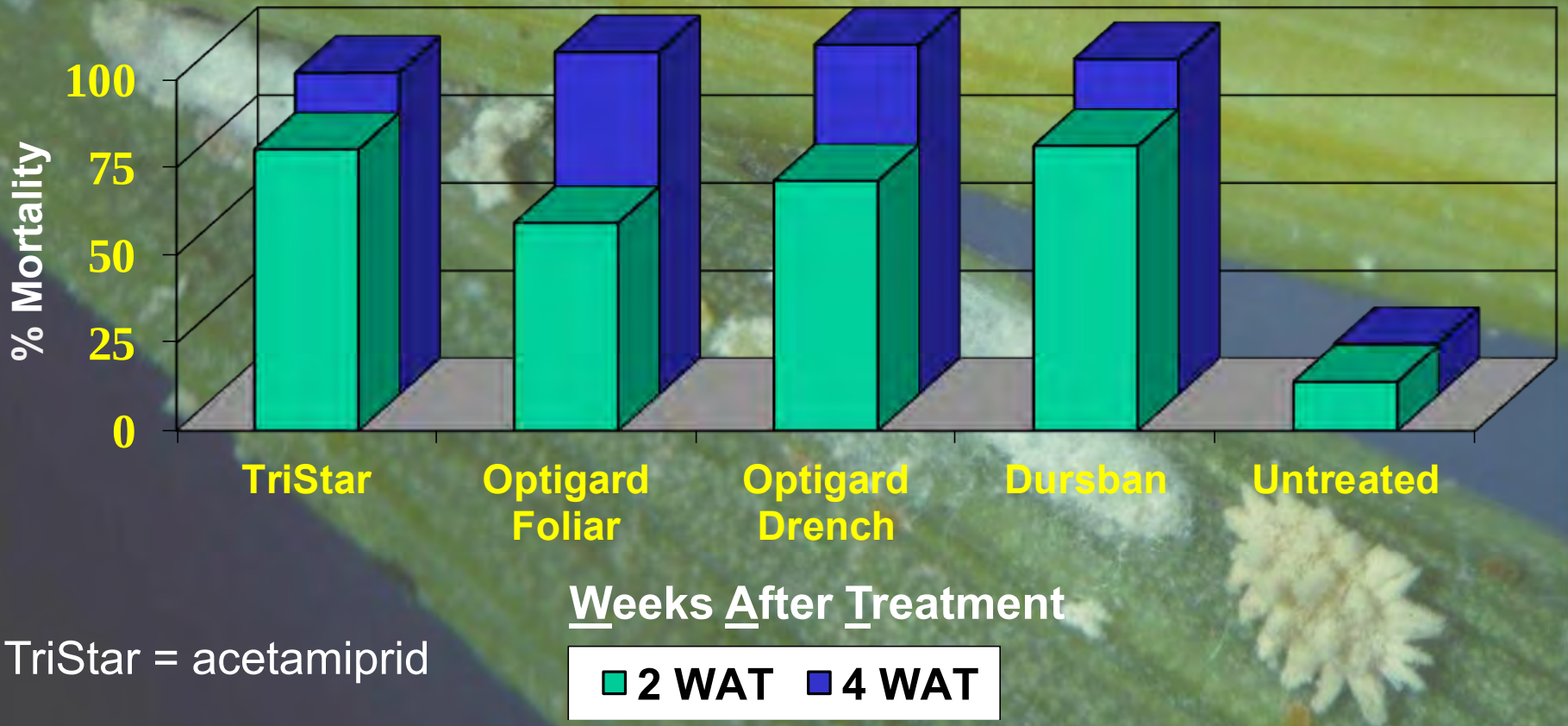
Precise Treatments

Phytotoxicty to anthuriums and orchids at 2X Precise Labeled Rate

Rippling of anthurium leaf margins and some slight discoloration

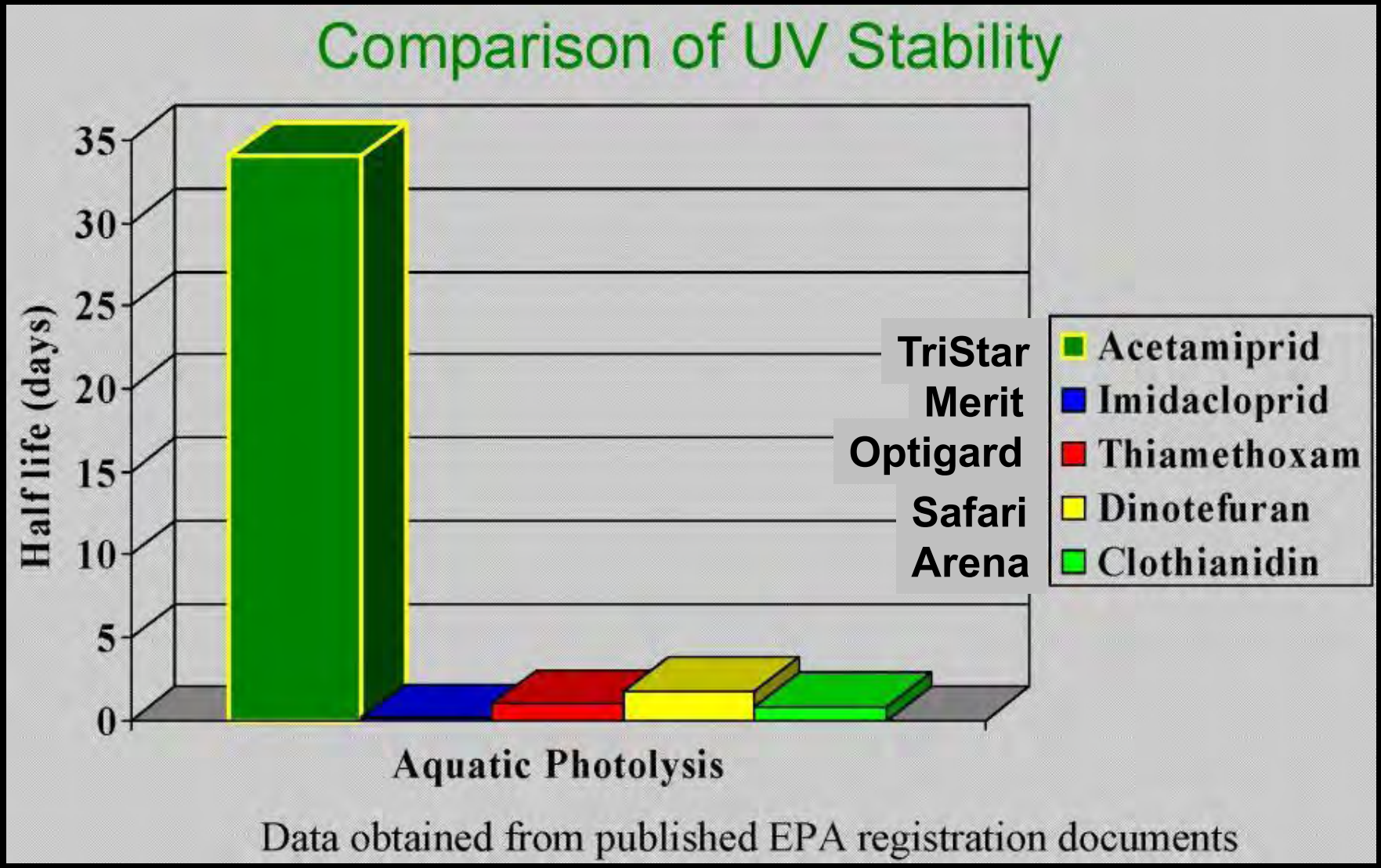
Precise treated Untreated

TriStar and Optigard Against the Coconut Mealybug, *Nipaecoccus nipae*



TriStar = acetamiprid

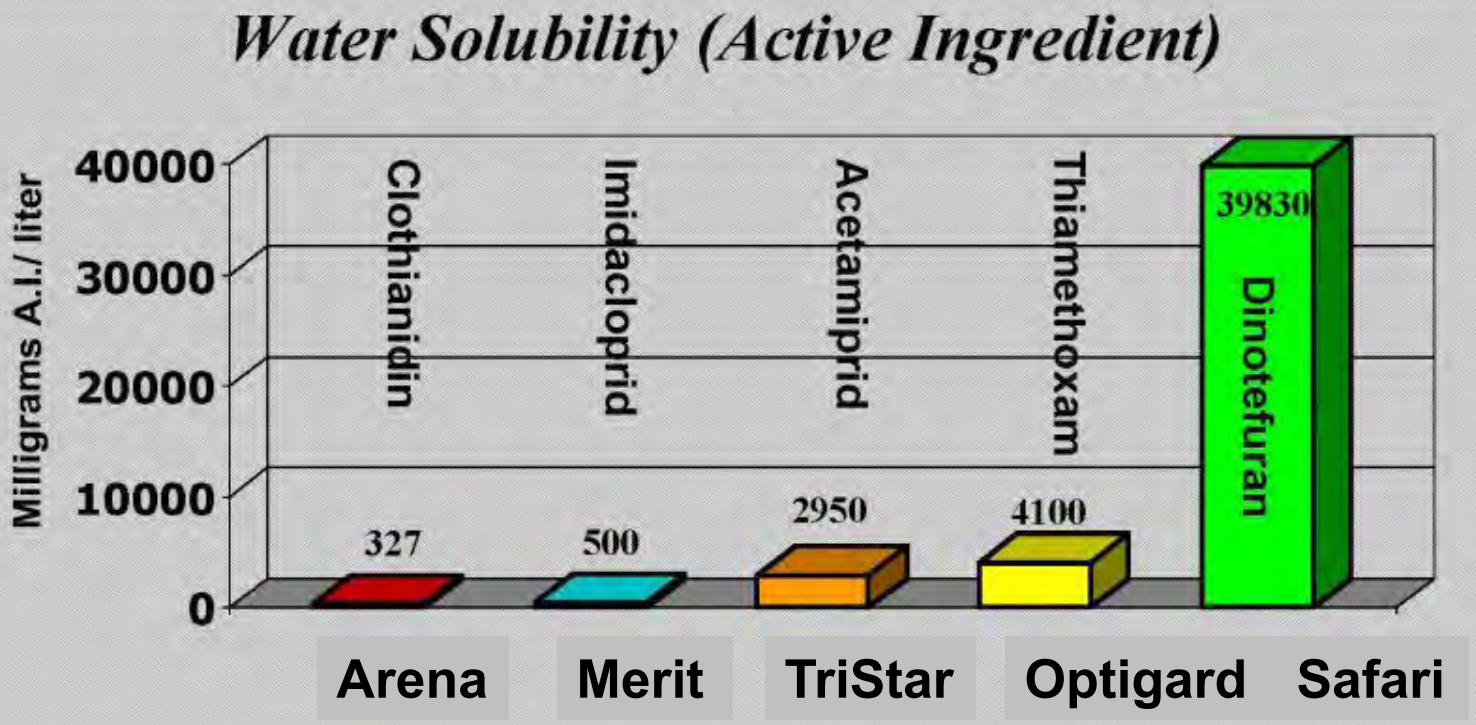
Optigard = thiamethoxam
(Now for sale in Hawaii)



TriStar is registered for foliar use only and is the most UV stable of all neonicotinoids.

Slide Credit: R. Fletcher

Relative Water Solubility of Neonicotinoids:



Information sources
Clothianidin (Celero), Acetamiprid (Tristar), Dinotefuran (Safari) – EPA Pesticide Fact Sheet
Imidacloprid (Marathon), hiamethoxam (Flagship) – MSDS for Products

Slide information courtesy J. Chamberlin

Efficacy of Neonicotinoids against Melon Aphids and Papaya Mealybug on Native *Hibiscus* sp.

Native *Hibiscus* sp

Melon Aphid, *Aphis gossypii*
Papaya Mealybug, *Paracoccus marginatus*

Efficacy of Neonicotinoids against Melon Aphids and Papaya Mealybug on Native *Hibiscus* sp.

Control
Pretreatment

Control
7 WAT

Merit 2.5G
Pretreatment

Merit 2.5G
7 WAT

Melon Aphids and Papaya Mealybug on Native *Hibiscus* sp

Coretect Pretreatment

Coretect 7 WAT

Safari 2G Pretreatment

Safari 2G 7 WAT

Level of aphid infestation on hibiscus plants before and after treatment

Treatment	Pretreatment	2 WAT	4 WAT	7 WAT
Control	H	H	M	M
Safari 2G	H	M	M	L
CoreTect NPK Tablets	H	M	L	S
Merit 2.5G	H	L	L	S

H = Heavy infestation, aphids present on 70% or more of plant surface area
M = Moderate infestation, aphids were present on 30-60% of plant surface area
L = Light infestation, aphids were present on at least 20% of plant surface area
S = no or slight infestation, aphids were either not present or were present onless than 5% of plant surface area

Level of mealybug infestation on hibiscus plants before and after treatment

Treatment	Pretreatment	2 WAT	4 WAT	7 WAT
Control	Y	Y	Y	Y
Safari 2G	Y	N	N	N
CoreTect NPK Tablets	Y	Y	Y	Y
Merit 2.5G	Y	Y	N	N

Y = mealybugs present
N = mealybugs not present

Application of Merit as a “Tablet”

Insert the “pill” in the pot media, and solve your pest problem.

Placing Merit tablet 2” below media surface

* >20 weeks of whitefly control
* >12 weeks of thrips control

Bark Application of Safari to King Protea for mealybugs at 18 oz/ gallon

Bark application of Safari to Telopea sp. for armored scales, *Pseudaulacaspis* sp.

Pseudaulacaspis brimblecombei

Spirotetramat
Tetronic/Tetramic Acid

MOVENTO

Crop Use:
- Vegetables
- Fruits
- Nuts

IRAC Class 23

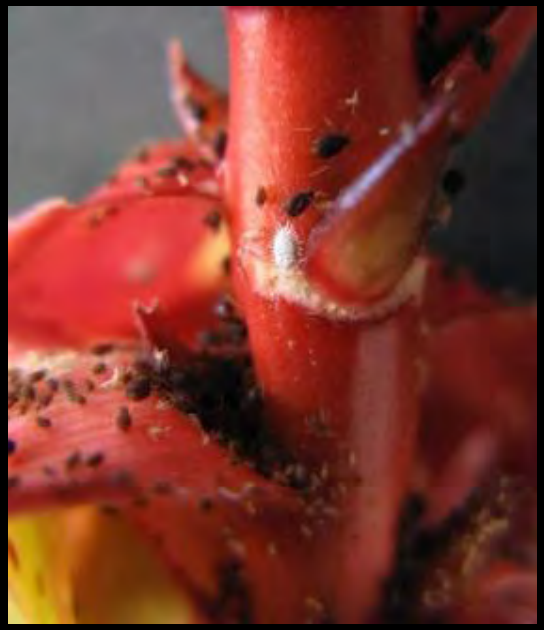
Key Pests:
Aphids
Mealybugs
Whiteflies
Scales
Spider mites
Psyllids/Psylla

Ornamental use:
- Greenhouse
- Field grown ornamentals
- Outdoor ornamentals

- Movento or Kontos (spirotetramat) moves up and down within the plant to provide excellent pest control in dense crop canopies and on plant roots.
- High level of residual efficacy and protection of new plant growth.
- Minimal risk to natural predators when used as directed, making it an ideal addition to Integrated Pest Management (IPM) programs.

Efficacy of Spirotetramat (Kontos) against aphids, foliar mealybugs, thrips and whiteflies

Severe thrips damage



ants, mealybugs, and banana aphids on stem and between bracts

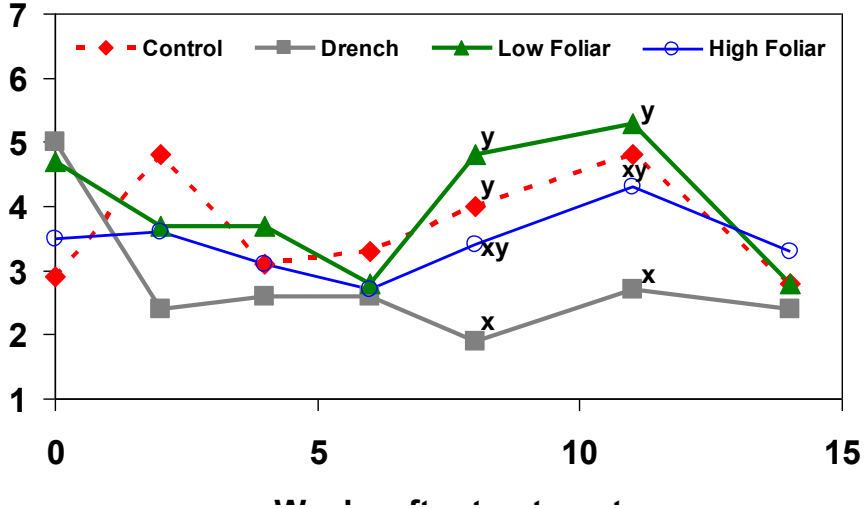
Severe – whitefly on >50% of sheath surface area

Kontos (spirotetramat)

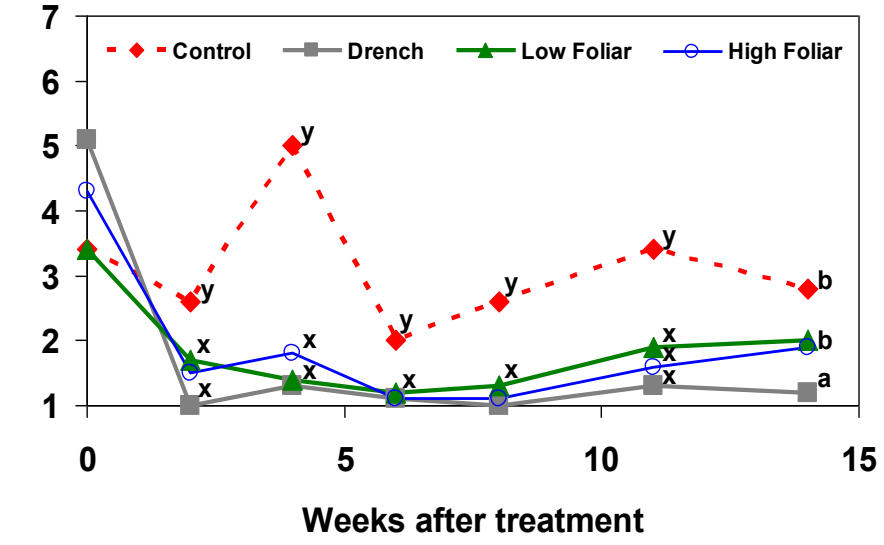
Drench: 0.4 fl oz/ft plant height
(1 application to root zone area)
Low Foliar: 1.7 fl oz/100 gallons
High Foliar: 3.4 fl oz/100 gallons
(2 applications 4 weeks apart)

- Drench application was most effective.
- Reduction in ants due to fewer honeydew-producing aphids and mealybugs.
- Drench application lasted for >14 weeks.

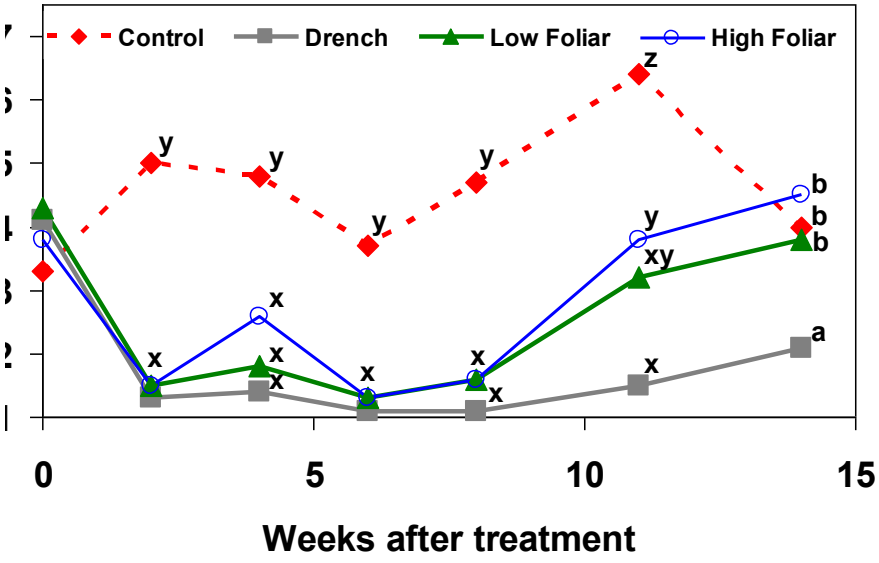
Level of ant infestation



Level of mealybug infestation

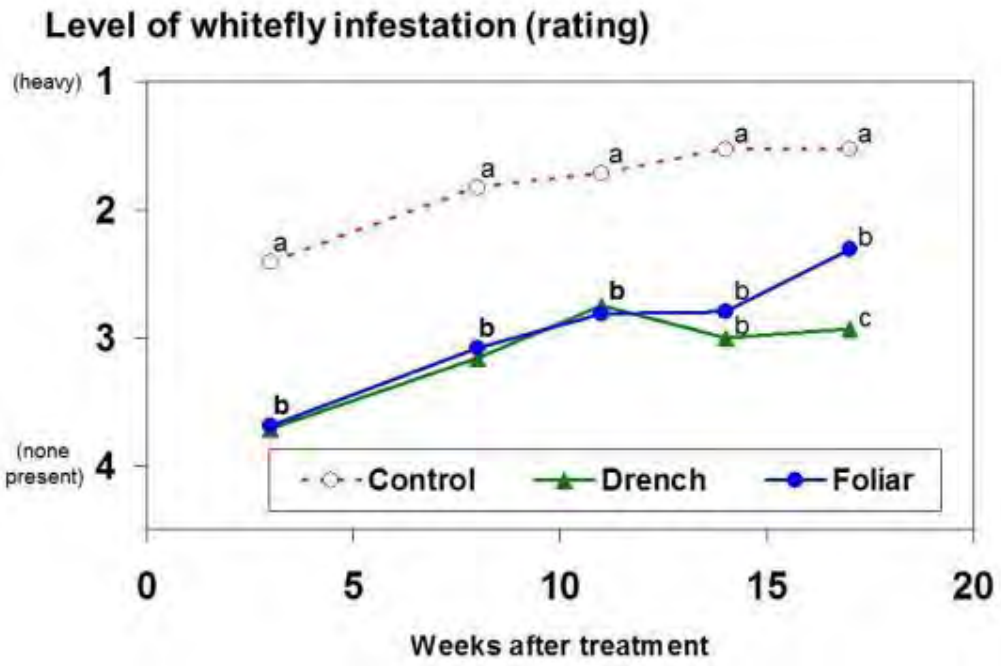


vel of banana aphid infestation



Anthurium Whiteflies

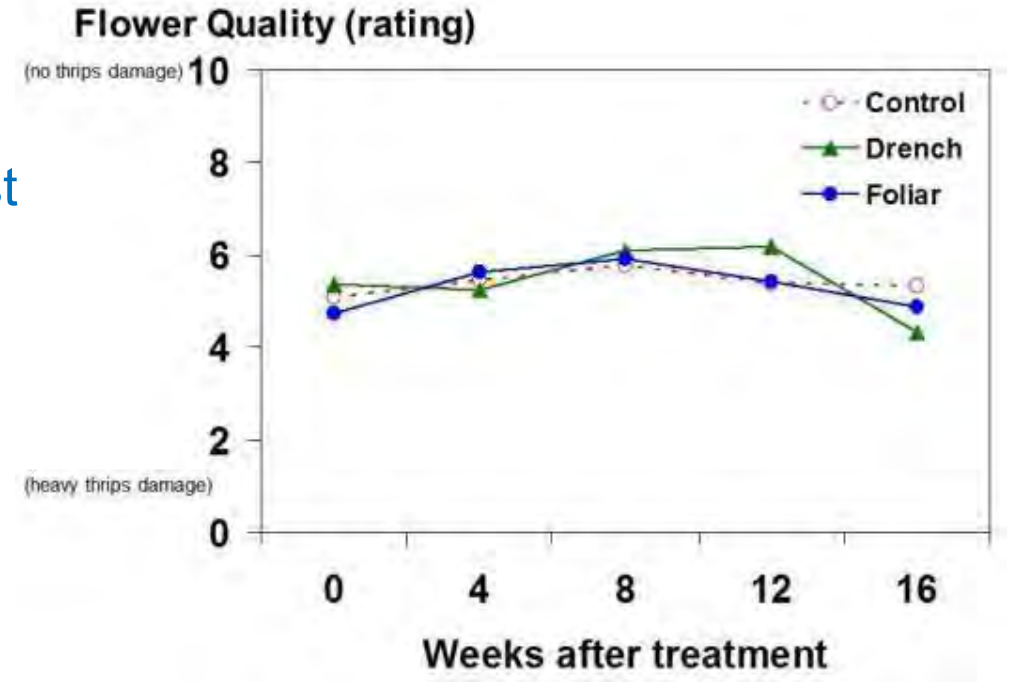
- Drench and foliar applications were effective from 3 to 17 weeks.($P<0.05$).
- Drench application was most persistent, providing whitefly control for >17 weeks.



Anthurium Thrips

- Kontos was not effective against anthurium thrips.

RATES:
Drench: 0.2 fl oz/ft plant height
Foliar: 3.4 fl oz/100 gallons



Efficacy of Acelepryn, Aria and Safari against the root mealybug, *Rhizoecus hibisci* infesting Rhapis palms.

Insecticide	IRAC Class	Mode of Action
Aria (flonicamid)	9B	Feeding blocker/nerve action
Safari (dinotefuran)	4A	Nerve action
Kontos (spirotetramat)	23	Inhibitor of lipid synthesis; Growth regulator disrupter
Acelepryn (chlorantraniliprole)	28	Nerve and muscle action Ryanodine receptor

Insecticide Resistance Action Committee
www.irac-online.org

To provide an effective and sustainable insecticide resistance management (IRM) strategy

What is resistance?

Resistance to insecticides is defined as '*a heritable change in the sensitivity of a pest population that is reflected in the repeated failure of a product to achieve the expected level of control when used according to the label recommendation for that pest species*'

Resistance Management Strategy:

Rotate among different Mode of Action classes/groups to provide a sustainable and effective approach to resistance management. Repeat same insecticide for 2 or 3 applications depending on pests' generation time.

Major Mode of Action Classification:

- Nerve and Muscle Targets (11 classes)
- Growth and Development Targets (7 classes)
- Respiration Targets (6 classes)
- Midgut Targets (1 class)
- Unknown or non-specific targets (1 class)

RESISTANCE MANAGEMENT (LABEL)


GROUP 4A INSECTICIDE

Safari

20 SG INSECTICIDE

KEEP OUT OF REACH OF CHILDREN

CAUTION

Safari 20 SG Insecticide contains a Group 4A insecticide. Insect biotype pest with acquired resistance to Group 4A may eventually dominate the insect population if Group 4A insecticides are used repeatedly in the same crop or in successive years as the primary method of control for a targeted species. This may result in partial or total loss of control of those species by *Safari* 20 SG Insecticide or other Group 4A insecticides To delay the development of insecticide resistance in greenhouse, nursery and interiorscape use sites strongly consider the following guidelines:

- Do not apply *Safari* 20 SG Insecticide or other Group 4A insecticides to consecutive generations of the same insect pest species.
- Do not drench soil media with *Safari* 20 SG Insecticide or other Group 4A insecticides more than one time per crop cycle or three months, whichever is shorter.
- Do not make more than two foliar or broadcast sprays of *Safari* 20 SG Insecticide or other Group 4A insecticides to a single crop during a two month period.
- Do not make more than one soil drench and one foliar or broadcast spray with *Safari* 20 SG Insecticide or other Group 4A insecticides during a two-month period.
- Base insecticide use on a comprehensive IPM program.
- Monitor treated insect populations for loss of field efficacy.
- Contact your local extension specialist, certified crop advisors, and/or manufacturers for insecticide resistance management and/or IPM guidelines for the specific site and resistant pest problems.

RESISTANCE MANAGEMENT

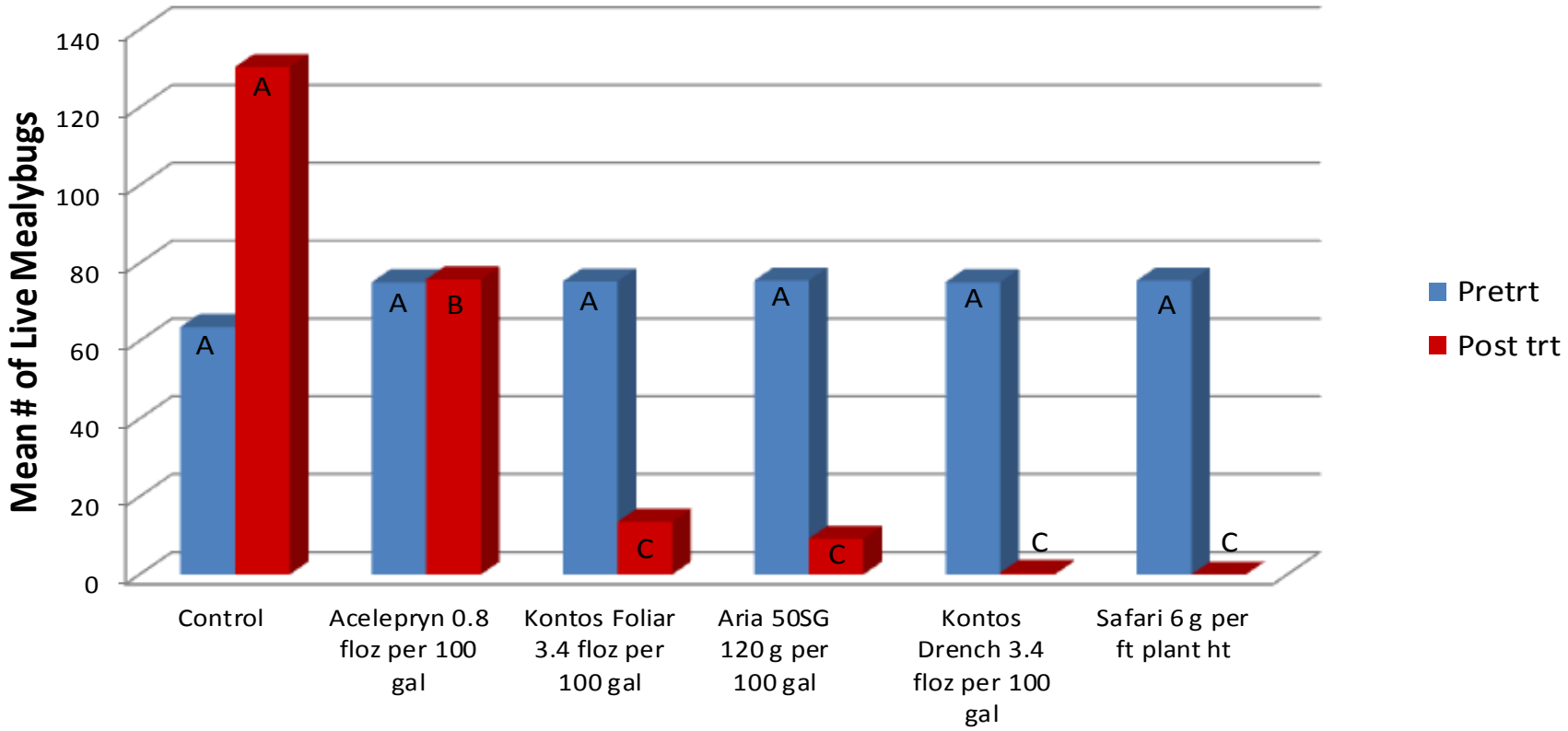
Link and pdf files to IRAC Insecticide Class Chart

http://www.irac-online.org/

http://www.ohp.com/Literature/pdf/CCC_XIII.pdf

- Do not rely on one product or tank mix or the same mode of action.
- When labels permit, make 2 or 3 applications of a product or tank mix in sequence, then rotate to products with different modes of action.
- Try to avoid applying the same mode of action to more than one generation of the pest.

Efficacy Study:
Managing Root Mealybug on *Rhapis Robusta*



Acelepryn 0.8 fl oz/100 gallons(drench application)
Aria 4.2 oz/100 gallons (drench application)
Kontos 3.4 fl oz/100 gallons (foliar and drench application)
Safari 0.2 oz/ft plant height (drench applicaton)

Summary

- Avoiding the use of broad-spectrum insecticide, such as OP's carbamates and pyrethroids, will conserve natural enemies.

- Use more selective insecticides and application methods, such as drench application of neonicotinoids (Merit, Safari), insect growth regulators (Distance,Talus), biological insecticides (Bt) to avoid negative effects on natural enemies.

- When applying insecticides/miticides, always focus on resistance management.

Conclusion

Comments from Insect Taxonomist, Bernarr Kumashiro, HDOA

"Plumeria is probably the most favorite host of Spiraling Whitlefly (SWF)."

"Plumeria is also a favorite host of papaya mealybug, many other mealybugs, scales, whiteflies, and aphids which love to feed on plumeria."

"We should encourage resort landscapers to choose other plants, since planting plumeria is just asking for trouble."


THANK YOU!
08 Feb 14