



# New chemistries

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# New chemistries for greenhouses

- cyflumetofen; Sultan (BASF; 2014)
- cyantraniliprole; Mainspring (Syngenta; 2015, 2016)
- flupyradifurone; Altus (Bayer; 2017)
- Coming soon - afidopyropen; Ventigra (BASF; 2019)

# Topics du jour

- Introduction to new chemistries
  - mode of action
  - pest spectrum
  - my trial results
- Integration into your program
- Compatibility with biological control









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# Topics du jour

- Introduction to new chemistries
  - mode of action
  - pest spectrum
  - my trial results
- Integration into your program
- Compatibility with biological control and other non-targets

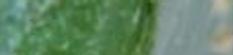


2017 Southeastern  
US Pest Control  
Guide for Nursery  
Crops and  
Landscape Plantings

<https://content.ces.ncsu.edu/southeastern-us-pest-control-guide-for-nursery-crops-and-landscape-plantings>

**2017** **Southeastern U.S.**  
**Pest Control Guide for Nursery  
Crops and Landscape Plantings**







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IRAC #	A.i.	Trade name	Use site	REI
6	abamectin	Avid, Lucid, Sirocco	L, N, G	12
6	melbemectin	Ultiflora	N	12
10A	clofentezine	Ovation SC	N, G	12
10A	hexythiazox	Hexygon DF	L, N, G	12
10B	etoxazole	TetraSan (Beethoven TR)	L, N, G (G)	12 (24)
12B	fenbutatin-oxide	ProMITE	L, N, G	48
13	chlorfenapyr	Pylon	G	12
20B	acequinocyl	Shuttle O (15SC)	N, G (L)	12
20D	bifenazate	Floramite, Sirocco	L, N, G	12
21A	fenazaquin	Magus	L, N, G	12
21A	fenpyroximate	Akari	N, G	12
21A	pyridaben	Sanmite	N, G	12
23	spiromesifen	Savate (aka Judo) (Forbid)	N, G, (L)	12
25	cyflumetofen	Sultan	N, G, L	12



# Sultan<sup>TM</sup>

miticide

- a.i. = cyflumetofen (IRAC # 25; mitochondrial complex II electron transport inhibitor)
- Use site: G, N, L, I
- REI: 12 hours
- Rate: 13.7 fl oz/100 gal
- Against spider mites only.
- Against eggs, nymphs and adults.
- Quick knock-down.
- Contact activity.
- Residual longevity = 28 days.
- Compatible with predatory mites.

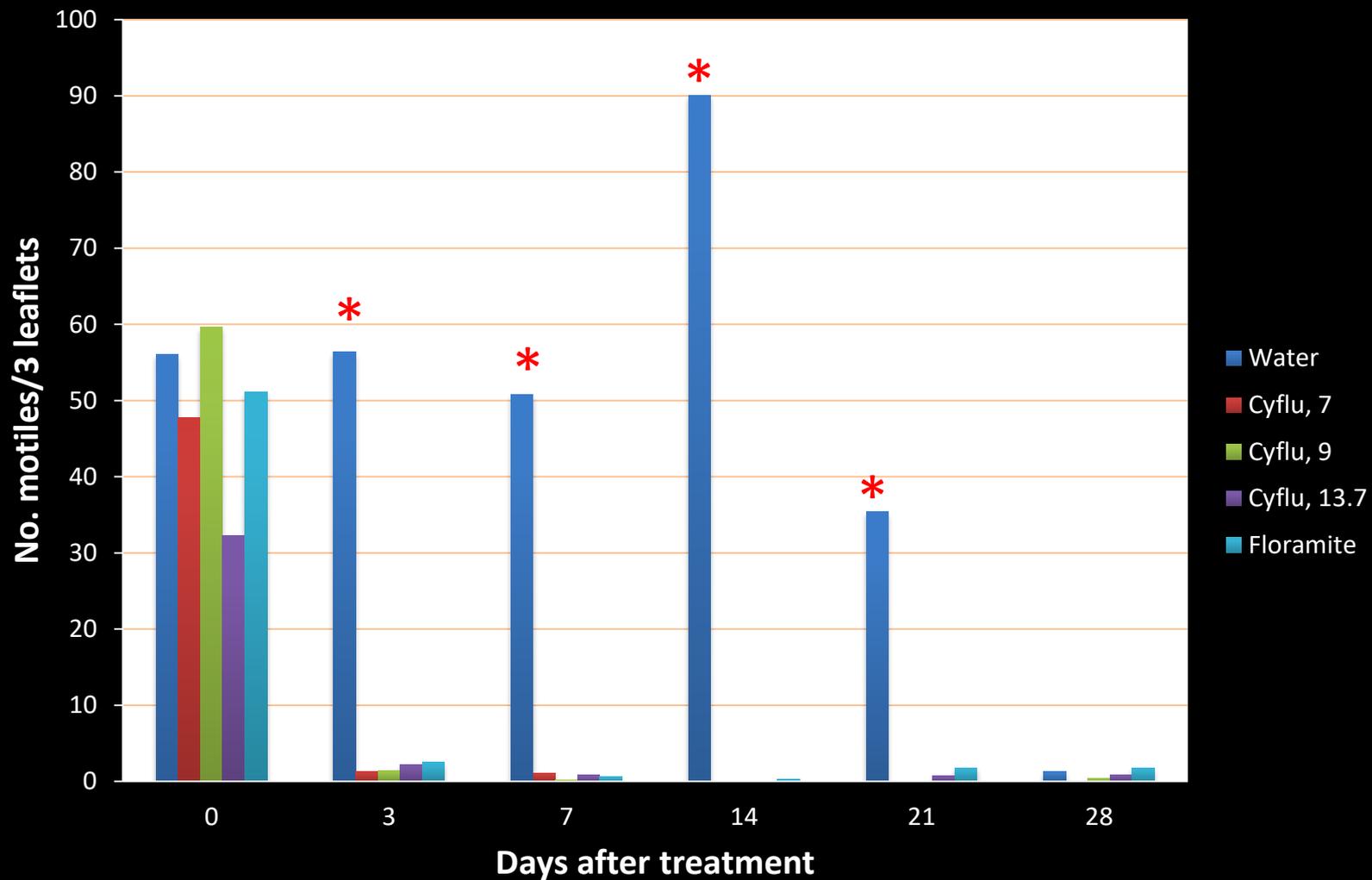
# Efficacy at various application rates

- Target: Twospotted spider mite (TSSM)
- Host: Marigold
- Site: Greenhouse
- Year: 2012
- Treatments (per 100 gal):
  - Sultan @ 7.0 fl oz
  - Sultan @ 9.0 fl oz
  - Sultan @ 13.7 fl oz
  - Floramite @ 4.0 fl oz
  - Water check



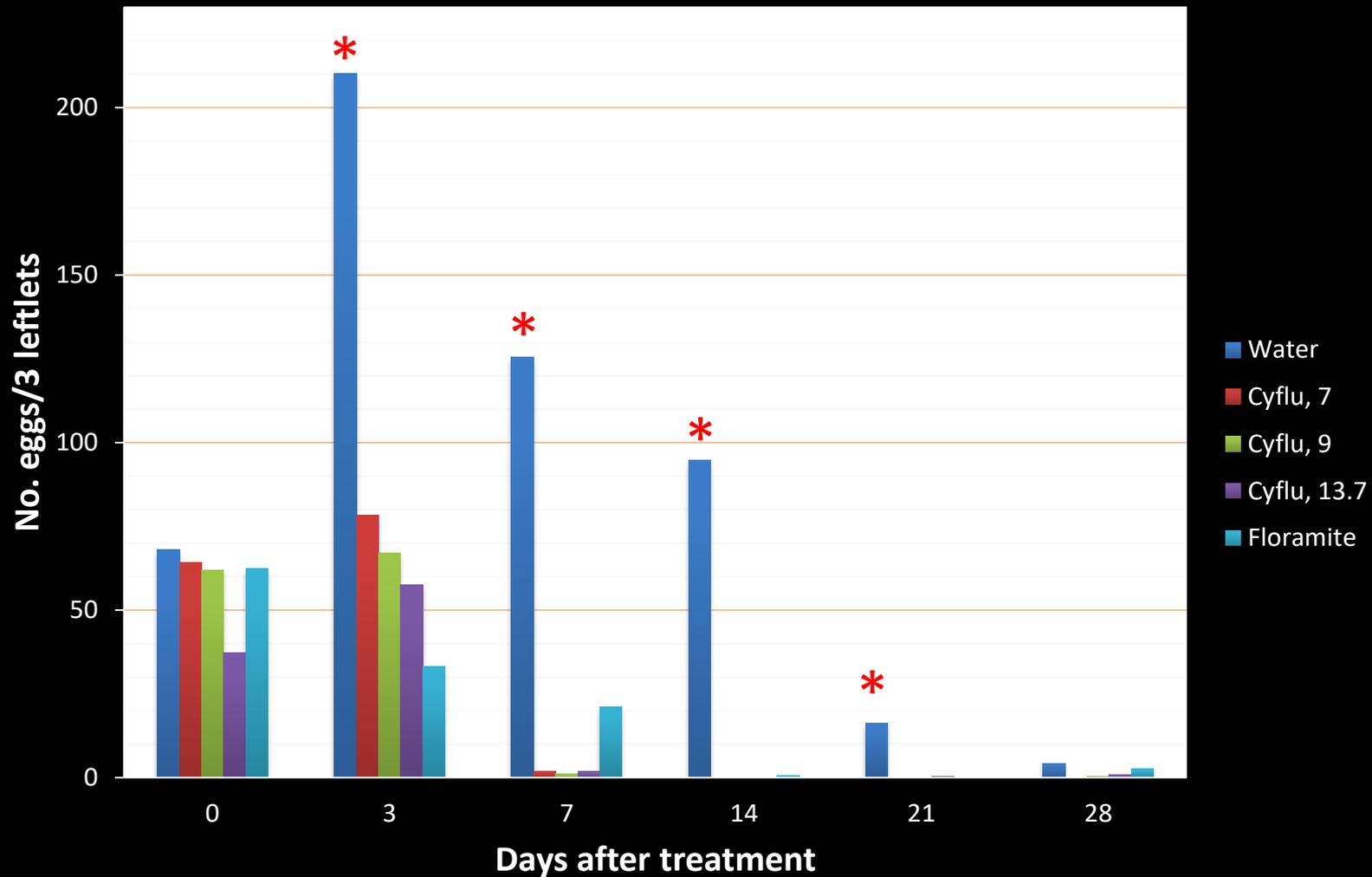
# Application rates

## Chong, 2012



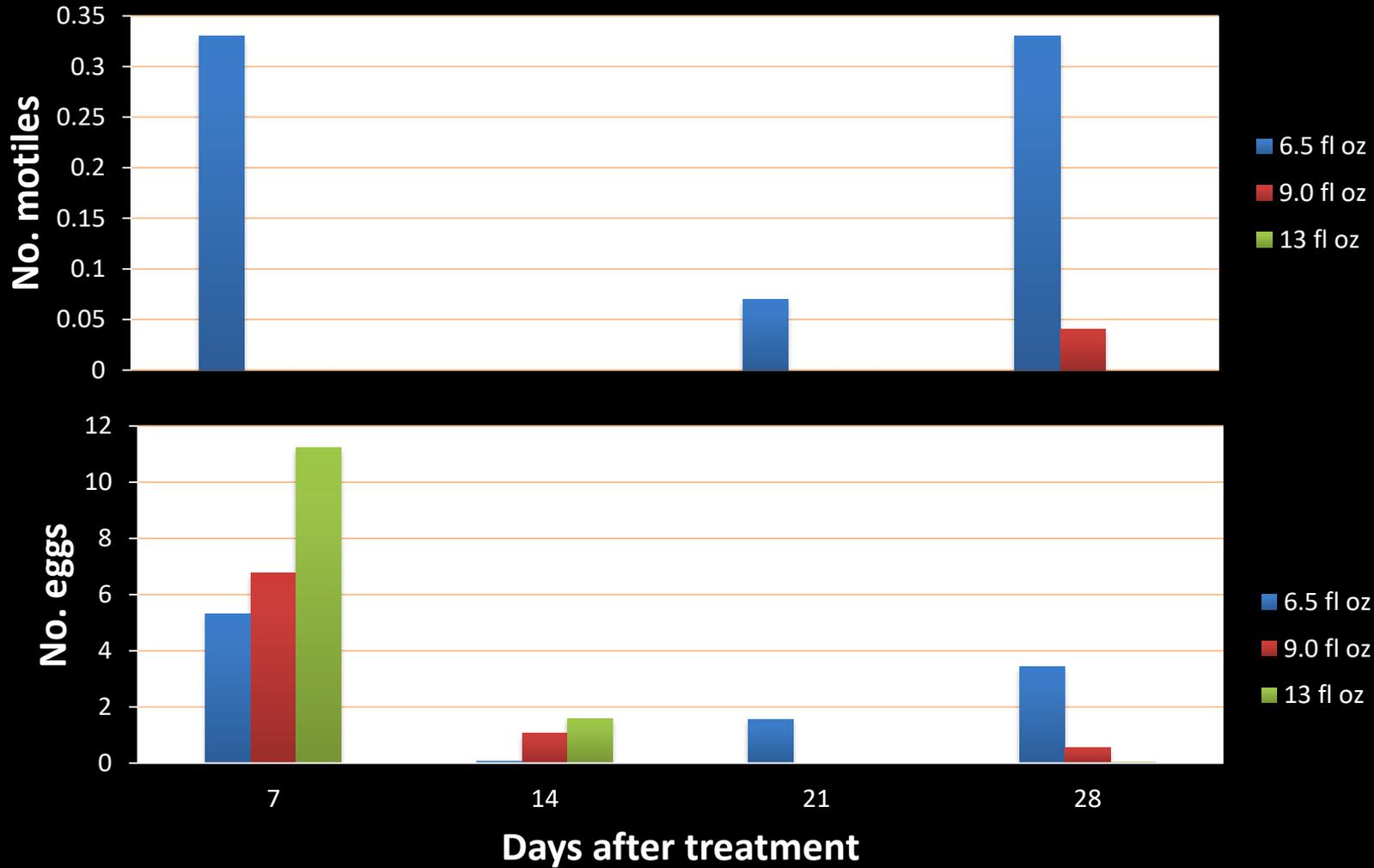
# Application rates

## Chong, 2012





# Why not below 13.7 fl oz/100 gal?



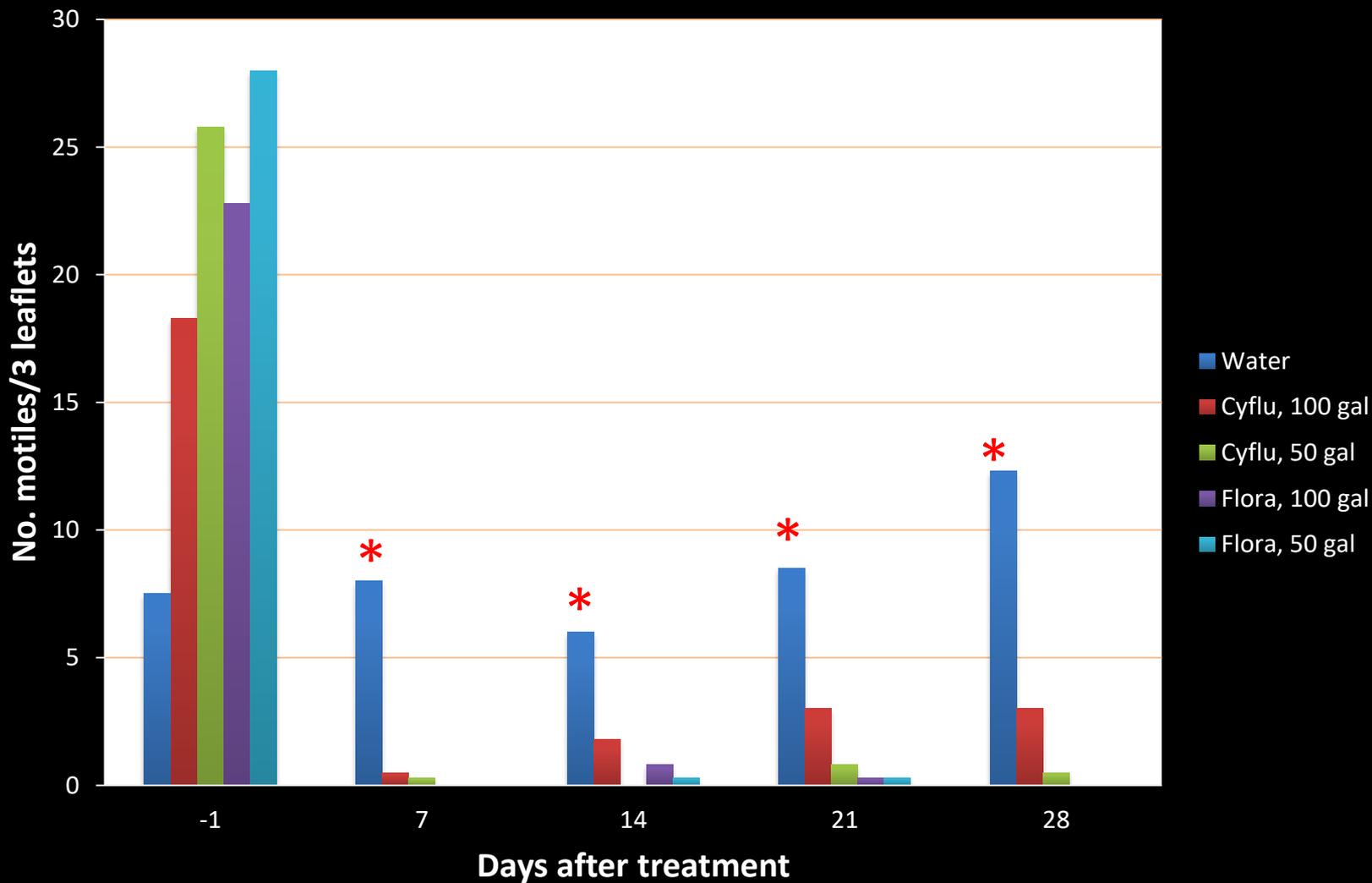
# Efficacy at various application volumes

- Target: Twospotted spider mite (TSSM)
- Host: Butterfly bush
- Site: Outdoor nursery
- Year: 2013
- Treatments:
  - Sultann @ 13.7 fl oz  
100 vs 50 gal/acre
  - Floramite @ 4.0 fl oz  
100 vs 50 gal/acre
  - Water check



# Application volume

## Chong, 2013

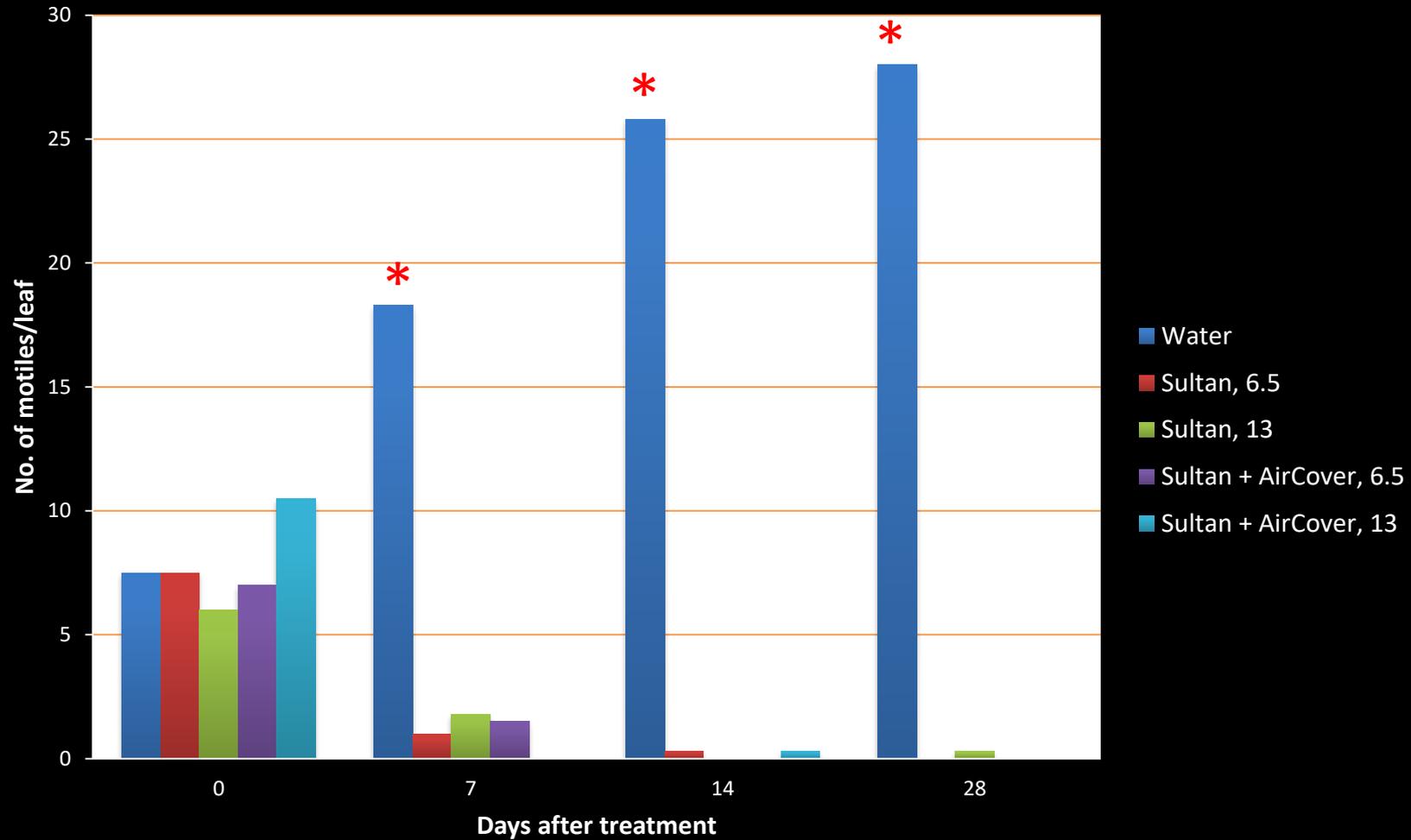


# Efficacy with the addition of an adjuvant

- Target: Twospotted spider mite (TSSM)
- Host: Butterfly bush
- Site: Outdoor nursery
- Year: 2013
- Treatments:
  - Sultan @ 6.5 and 13.7 fl oz
  - Sultan @ 6.5 and 13.7 fl oz  
+ AirCover @ 8 fl oz
- Water check



# Adjuvant Chong, 2013





# Summary on Sultan

- Effective against spider mites (twospotted, southern red, Lewis, spruce)
  - Nymphs and adults – within 3 days
  - Eggs – 3 days
- Application rates
  - 13.7 fl oz, > 28 days
  - 9 fl oz, < 28 days
  - < 7 fl oz, not recommended
- No difference between 50 and 100 gal (application volume) in greenhouses and outdoor.
- No difference with or without adjuvant.
- Compatible with predatory mites.



# Compatibility of Sultan with biological control program

- Can results from laboratory studies be readily translated to the field?
- Spider mite is not the only pest. If another biological control agent is being used against another pest (e.g., *Amblyseius swirskii* against whiteflies and thrips), can Sultan be safely used and integrated into a IPM program?
- Sultan does not have translaminar activity. If a grower does not achieve full coverage, can *Phytoseiulus persimilis* be used to 'clean up' the remaining or hidden colonies of spider mites after Sultan treatment?
- Can a grower uses Sultan to reduce TSSM population before releases of *Phytoseiulus persimilis*? How long does he have to wait for release?



# Standardized, multi-state study on the compatibility of Sultan to BC

- Three studies conducted at three states:
  - Jim Bethke, San Marcos, CA
  - JC Chong, Florence, SC
  - Lance Osborne, Apopka, FL
- Same experimental protocol.
- Similar environmental conditions, only differ in location.
- This will make the studies comparable and the results can be translated readily to the growing conditions in greenhouses in the southern and western U.S.

# Standardized, multi-state study on the compatibility of Sultan to BC

- Target:

*Amblyseius swirskii*

*Phytoseiulus persimilis*

- Treatment:

Water check

Sultan @ 13 fl oz/100 gal

Sultan @ 6.5 fl oz/100 gal

Avid @ 4 fl oz/100 gal (negative check)

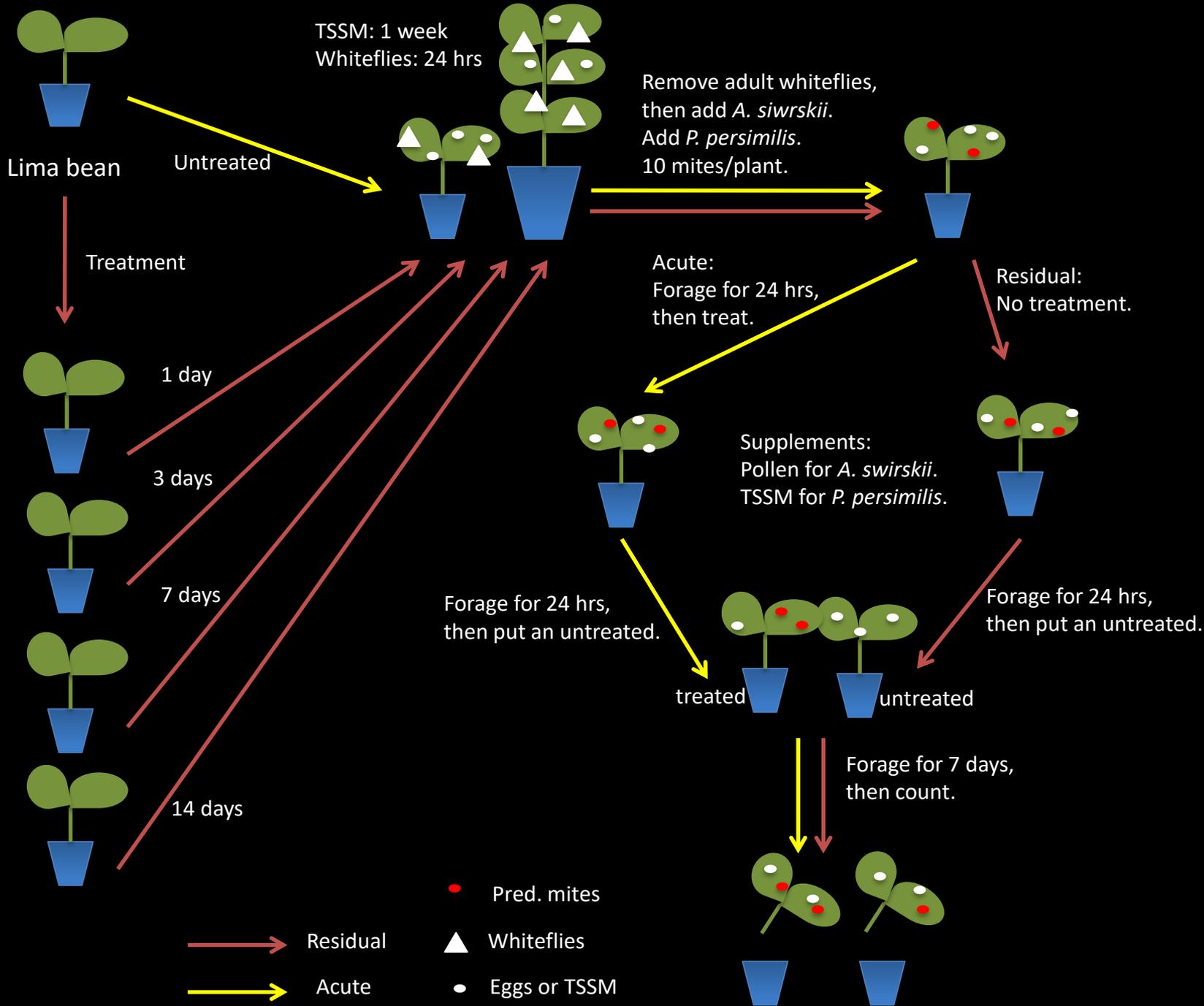
Floramite @ 4 fl oz/100 gal (positive)

- Measure

Acute mortality (treatment at 24 hours after release)

Residual mortality (release at 1, 3, 7 and 14 days after treatment)











# How compatible is Sultan with biological control?

- Preliminary results from greenhouse tests in 3 states showed that Sultan is comparable to Floramite in its compatibility to *Amblyseius swirskii* and *Phytoseiulus persimilis*.

## Acute toxicity:

Survival of predatory mite on plants treated with Sultan at 13 fl oz was similar to those treated with water and Floramite.

Growers can spray Sultan with minimal impacts to existing predatory mite populations.

## Residual toxicity:

Survival on plants treated with Sultan at 13 fl oz was lower than those treated with water and Floramite at 1 and 3 DAT.

Growers should wait at least 7 days after spraying with Sultan before releasing predatory mites.



Tell me something about Altus and  
Mainspring...



# Consequences of moving away from neonics...

- Increased pest issues with certain production systems.
- Increased need for alternative chemicals.
- Increased use of “oldies and goodies”.
- Increased use of biological control.



# Systemic alternatives to neonics

- flupyradifurone (Altus) – 4D  
aphids, whiteflies, mealybugs, scales, thrips
- spirotetramat (Kontos) – 23  
aphids, whiteflies, mealybugs, scales, thrips  
mites
- cyantraniliprole (Mainspring) – 28  
aphids, whiteflies, scales, thrips  
beetles, caterpillars



# Systemic alternatives to neonics

- Foliar – curative
  - Need to scout and find the pest populations in its early stage of build-up.
  - Alternatives are as effective as neonicotinoids.
- Drench – preventive
  - The alternatives are typically slower acting than neonicotinoids.
  - Drench before or as soon as the pest population shows up.
  - Only for crops and pests that are of constant problems.
  - Useful in some situations.



# Mainspring<sup>®</sup>GNL

- a.i. = cyantraniliprole (IRAC # 28; ryanodine receptor modulator)
- Use site: G, N, L, I
- REI: 4 hours
- Rates:

aphids	4-8 fl oz/100 gal
lace bug, beetles, caterpillars, thrips, whiteflies, leafminers, soft scales	2-8 fl oz/100 gal
Drench	8-12 fl oz/100 gal
- Contact and systemic activity.



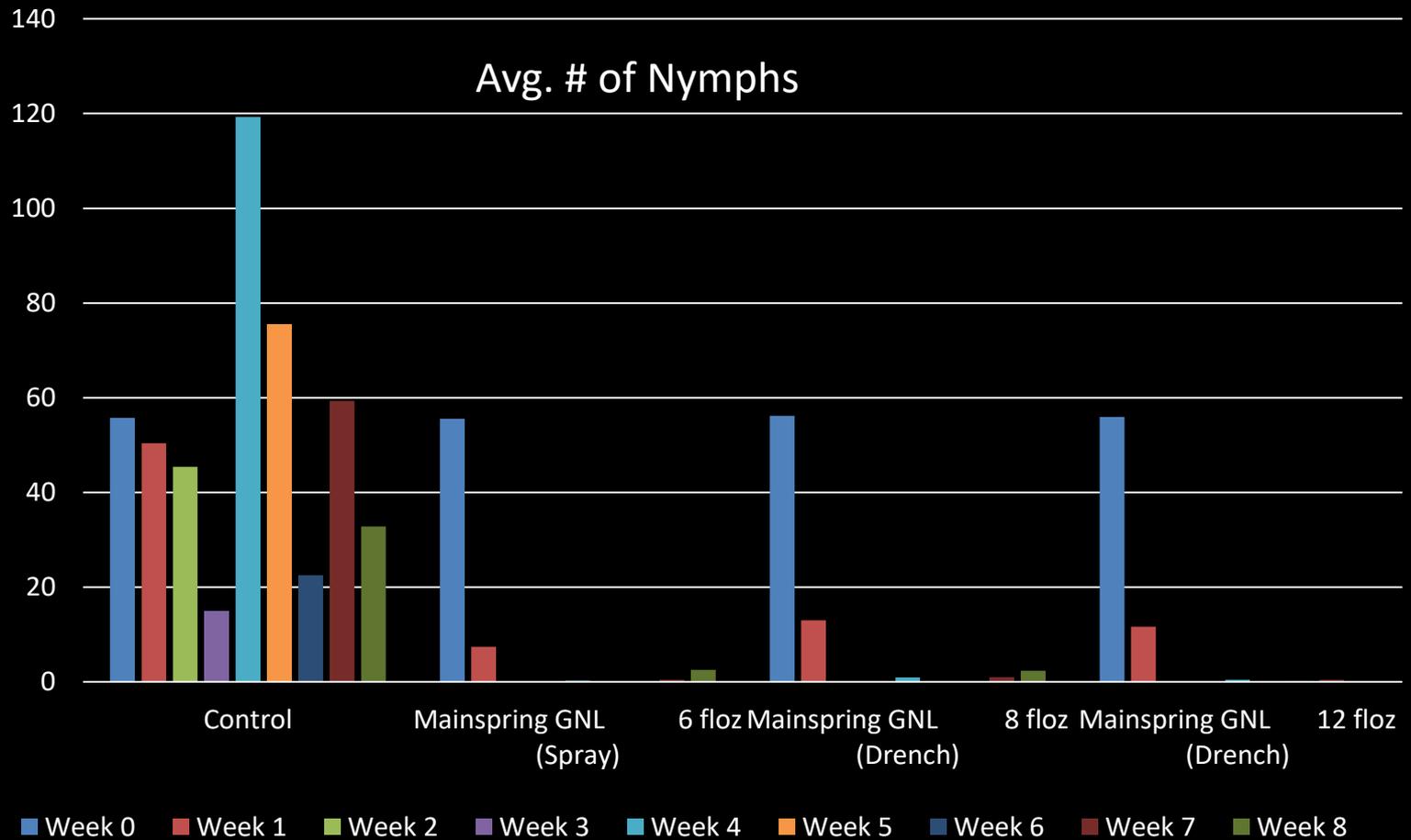
# Mainspring<sup>®</sup>GNL

- Compatibility with biological control (Koppert side effects)

Swirski mite	Unknown
Phytoseiulus persimilis	Harmless
Minute pirate bug	Harmless
Aphid parasitoid	Unknown
Green lacewing	Harmless
Whitefly parasitoid	Unknown
Bumble bee	Harmless

# Mainspring vs whiteflies

2016 – Osborne, UFL- Apopka



Hibiscus plants grown in 4-inch containers

Drench treatment: 3 floz

Spray Treatment : Twice on 14 day interval w/ Capsil 6 floz

Six Replicates: Counts made on two leaves per plant

# Mainspring vs whiteflies

2016 – Osborne, UFL- Apopka



Rehcigl

**Control**



Rehcigl

**Mainspring 8 floz drench**

# Mainspring vs whiteflies

2016 – Osborne, UFL- Apopka



Untreated Control



Mainspring 8 floz drench

# Chemical control of WFT

Systemic insecticides – Effective only against individuals feeding on foliage

IRAC #	a.i.	Trade name	WFT
4A	acetamiprid	TriStar (foliar)	P (P-E)
	dinotefuran	Safari	P (P-E)
	imidacloprid	Marathon, etc.	
	thiamethoxam	Flagship	P (P-E)
3A + 4A	cyfluthrin + imidacloprid	Discus N/G	P
4D	flupyradifurone	Altus (foliar)	
23	spirotetramat	Kontos	P (P-E)
28	cyantraniliprole	Mainspring	G (F-E)

WFT – western flower thrips

Aggregates of IR-4 trials. Efficacy: P < 50%; F = 50-75%; G = 75-95%; E > 95%

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'+' = Capsil  
added

'D' = Drench  
'F' = Foliar

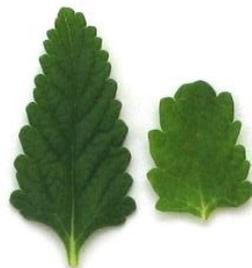
Floret, 8 WAT



Water check



Conserve SC,  
11 fl oz, 3x F



Flagship 25WG,  
8.5 oz, 3x F



Flagship 25WG,  
8.5 oz, 1x D



Capsil, 6 fl oz,  
3x F



Mainspring +,  
4 fl oz, 3x F



Mainspring +,  
8 fl oz, 3x F



Mainspring,  
8 fl oz, 3x F



Mainspring,  
12 fl oz, 3x D



Mainspring,  
12 fl oz, 1x D



ID  
Flora



'+' = C  
Ide



'D' = Dren  
'F' = Tol



**Water check**

**Conserve SC,  
8 fl oz, 3x F**

**Flagship 25WG,  
8.5 fl oz, 1x F**

**Flagship 25WG,  
8.5 fl oz, 1x F**

**Capsil, 6 fl oz,  
3x F**



**Mainspring +,  
4 fl oz, 3x F**

**Mainspring +,  
8 fl oz, 3x F**

**Mainspring,  
8 fl oz, 3x F**

**Mainspring,  
12 fl oz, 3x D**

**Mainspring,  
12 fl oz, 1x D**



Altus™

- a.i. = flupyradifurone (IRAC # 4D; nicotinic acetylcholine receptor competitive modulator)
- Use site: G, N, L
- REI: 12 hours
- Rates:

aphids	7-10.5 fl oz/100 gal
mealybugs, scales, thrips	10.5-14 fl oz/100 gal
whiteflies	
Drench	21-28 fl oz/100 gal
- Contact and systemic activity.



Altus™

- Compatibility with biological control (Koppert side effects)

Swirski mite	Moderately harmful
Phytoseiulus persimilis	Moderately harmful
Minute pirate bug	Unknown
Aphid parasitoid	Harmless
Green lacewing	Unknown
Whitefly parasitoid	Unknown
Bumble bee	Harmless

# Altus and BotaniGard vs mealybugs



Untreated



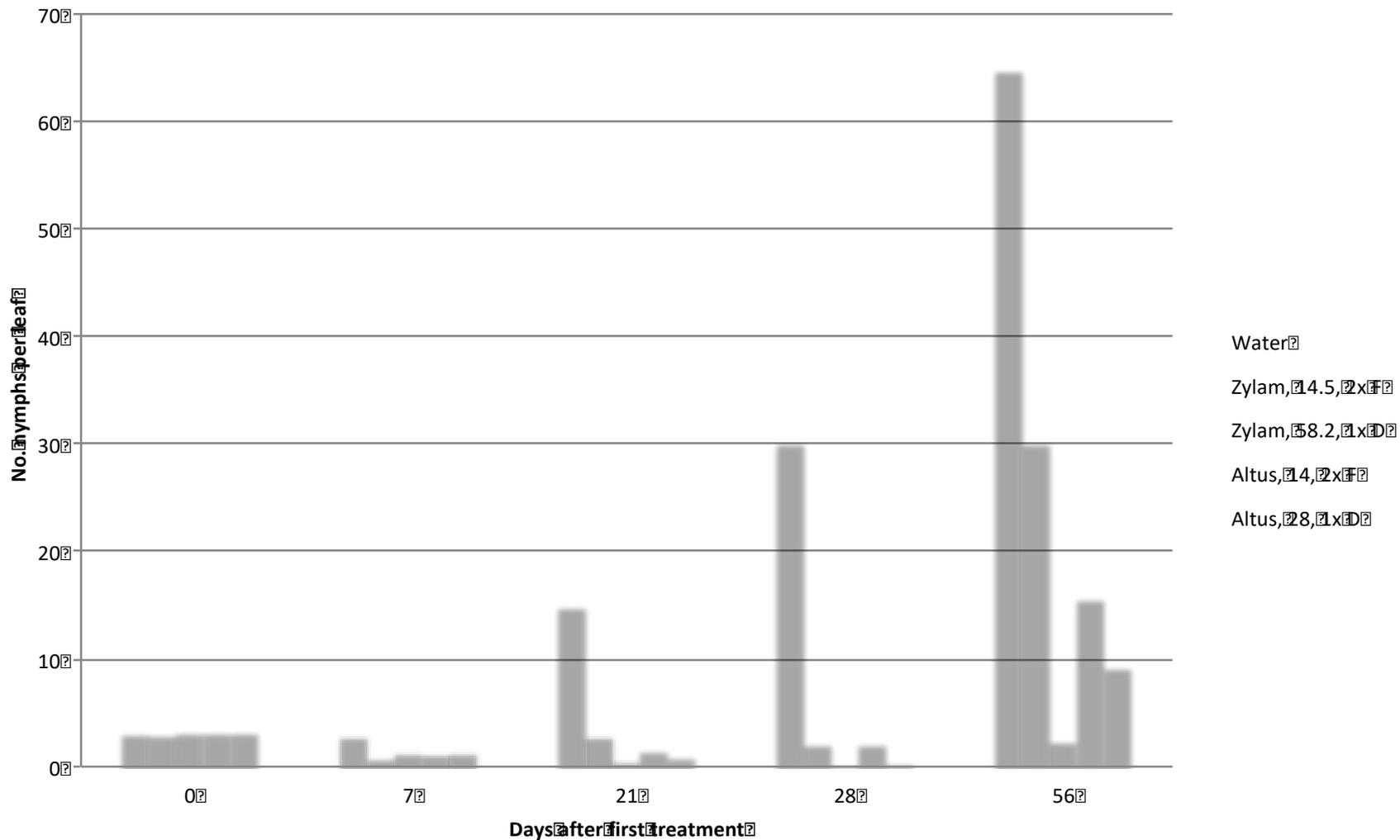
Botanigard 4 x at 32 fl oz



Altus 2 x at 14 fl oz

# Spray or drench?

## Altus and Zylam vs mealybugs





# Spray or drench?

- Purpose:
  - Spray – Curative
  - Drench – Preventive
- Tissues infected:
  - Spray – Flower and older tissues
  - Drench – Actively growing tissues
- Time to finish
  - Spray – Quick result; closer to shipment
  - Drench – At least 2 weeks before treatment



# Speed and longevity of systemics

- Speed

Depends on the molecules, plant size and environmental conditions

Neonicotinoids > Altus > Mainspring > Kontos

- Longevity

In general 4-6 weeks.

Older leaves are better protected than young leaves.

“Yes, they are systemic but they don’t go back down the pipes.”

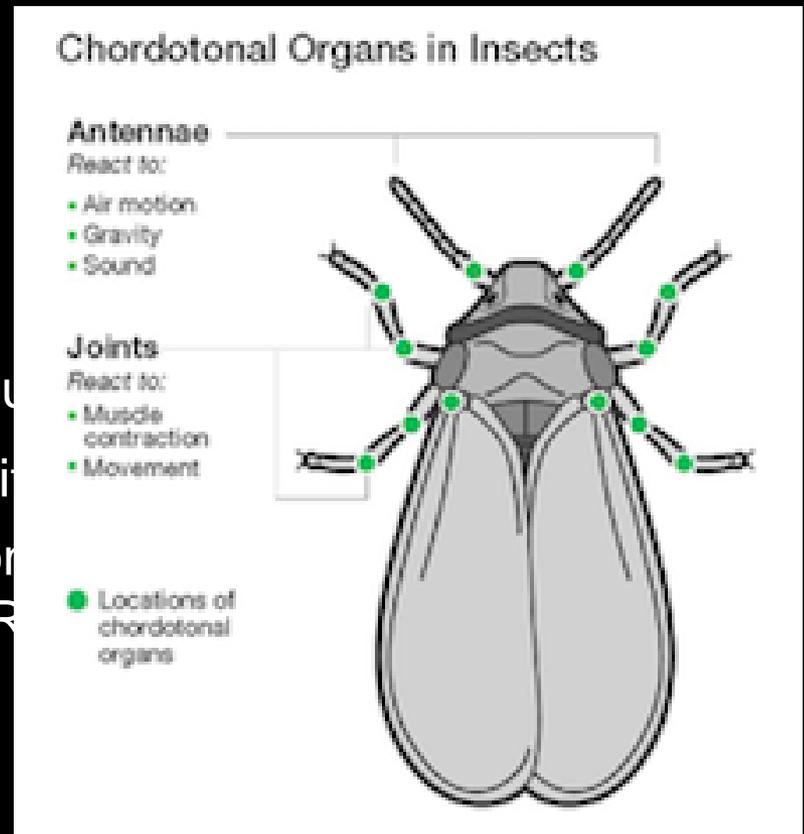


# Pollinator protection

- Greenhouse & nursery:
  - Follow instructions in the “bee box”
  - Spray: No less than 2 weeks before ship/sale
  - Drench: No less than 4 weeks before ship/sale
- Landscape & lawn:
  - Follow instructions in the “bee box”
  - Ornamentals: Do not apply during bloom.
  - Turf: Mow and remove all flowering weeds before application.

# Ventiga

- a.i. = afidopyropen (IRAC # 9D; chordotonal organ TRPV channel modulator)
- Same MOA as pymetrozine (Endeavor) and pirifluquinazon (Rycar)
- Use site: G, N, L
- REI: 12 hours
- Rates:
  - aphids
  - whiteflies, scales, mealybugs
- Contact and translaminar activity
- Compatibility with biological control likely similar to Endeavor and Rycar





# Ventiga

- a.i. = afidopyropen (IRAC # 9D; chordotonal organ TRPV channel modulator)
- Same MOA as pymetrozine (Endeavor) and pyrifluquinazon (Rycar)
- Use site: G, N, L
- REI: 12 hours
- Rates:

aphids	1.4 fl oz/100 gal
whiteflies, scales, mealybugs	4.8-7 fl oz/100 gal
- Contact and translaminar activity.
- Compatibility with biological control largely unknown, but likely similar to Endeavor and Rycar, i.e. very compatible.

# Ventigra vs green peach aphid

Product	Appl. rate	Method & Freq.
Water	-	Foliar; 2x
Ventigra	1.4 fl oz	1x; before
Ventigra	1.4 fl oz	1x; after
Ventigra	1.4 fl oz	2x; 7 days
Ventigra	1.4 fl oz	2x; 14 days
Ventigra	1.4 fl oz	2x; 21 days
Ventigra	1.4 fl oz	2x; 28 days
Mainspring	4 fl oz	2x; 14 days
Endeavor	5 oz	2x; 14 days
Marathon II	8.37 fl oz	1x; drench

- What we learned:
  - “Before infestation” treatment protected the calibrachoa.
  - Reapplication interval did not make much difference; one application should protect for 28 days.
  - Ventigra applied twice at 28 days can provide protection similar to that of systemic insecticides.

# Ventigra vs sweetpotato whitefly

Product	Appl. rate	Method & Freq.
Water	-	Foliar; 2x
Ventigra	4.8 fl oz	1x
Ventigra	6.8 fl oz	1x
Ventigra	4.8 fl oz	2x; 14 days
Ventigra	6.8 fl oz	2x; 14 days
Mainspring	4 fl oz	1x

- What we learned:
  - Ventigra at 6.8 fl oz achieved faster and greater knockdown than Ventigra at 4.8 fl oz or Mainspring.
  - One application of Ventigra at 6.8 fl oz was similar to two applications of Ventigra at 4.8 fl oz and one application of Mainspring.
  - Efficacy increased with application frequency.

