A decade of psyllid suppression and strategies with newly developed and conventional chemicals

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UF|IFAS UNIVERSITY of FLORIDA

Asian citrus psyllid (ACP)

- Feeds on all types of citrus and other hosts such as orange jasmine
- A single female can lay several hundred eggs
- Economically important pest, **vector of pathogens causing huanglongbing (HLB) disease**

Eggs

Nymphs

Adult

ACP and HLB

Impact on tree health and production

Open production system

Mini-CUPS
(Tree defenders, Individual Protective Covers, IPCs)

Citrus Under Protective Screen (CUPS)

ACP/HLB Management

Protected citrus

- Citrus Under Protective Screen (CUPS)
- Individual Protective Covers (Mini-CUPS, Tree defenders)

Traditional open orchards

- Chemical Control of Asian citrus psyllid (ACP)

Integrated Pest Management

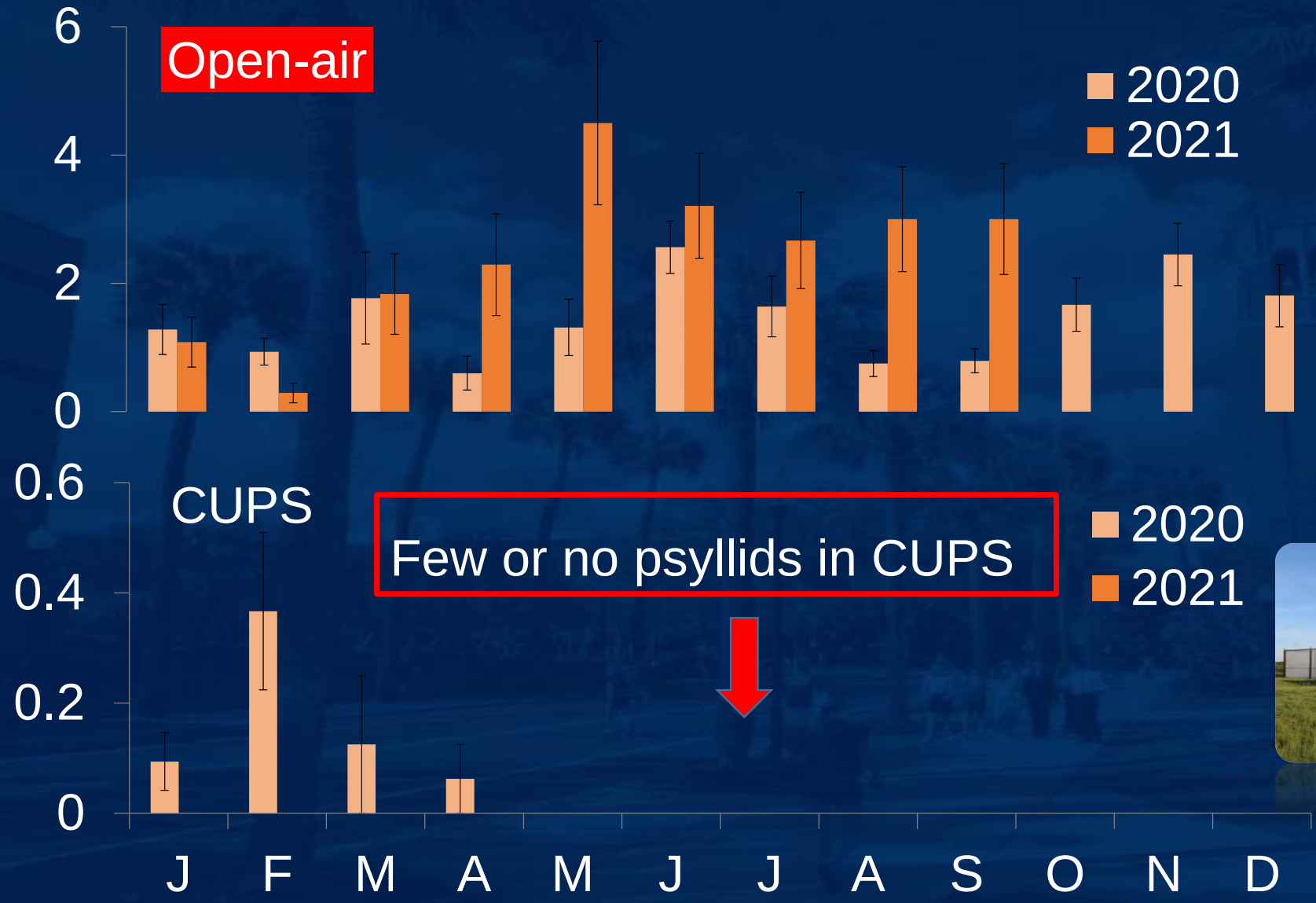
Biological

Chemical

Cultural

Host Plant Resistance

Impact of CUPS on ACP: Adults per sticky card (mean ± SE)

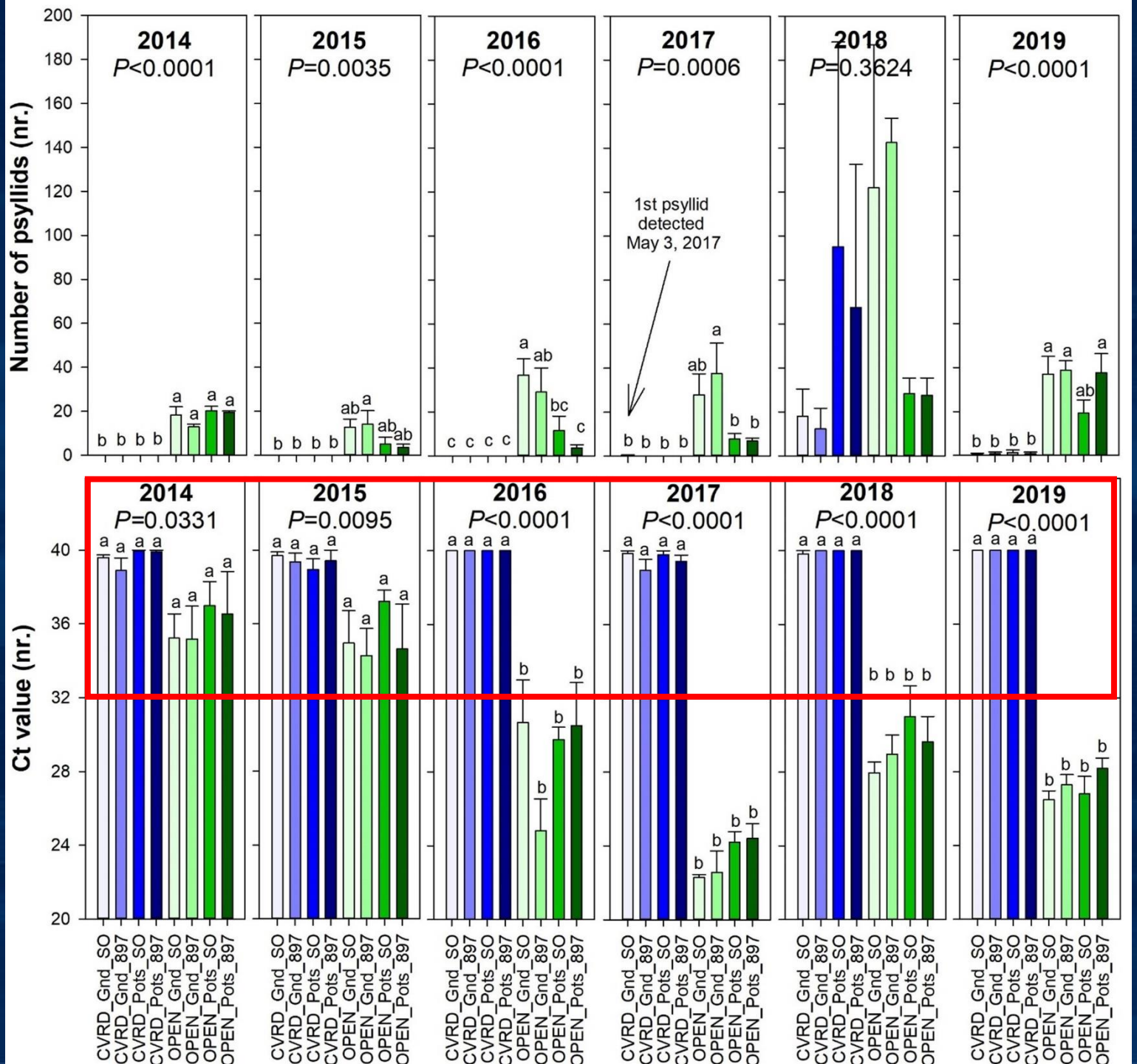


Al-Shami and Qureshi, unpublished

Ferrarezi, R. S; Qureshi, J. A.; Wright, A. L.; Ritenour, M. A.; Macan, N. P. F.. 2019. Citrus production under screen as a strategy to protect grapefruit trees from huanglongbing disease. *Frontiers in Plant Science* 10(1598): 1-16. DOI: 10.3389/fpls.2019.01598

No HLB in CUPS

UF-IRREC location



Other pests detected in the CUPS

Citrus leafminer

Scales

Thrips

Mealybugs

Mites

Citrus rust mite

Citrus red mite

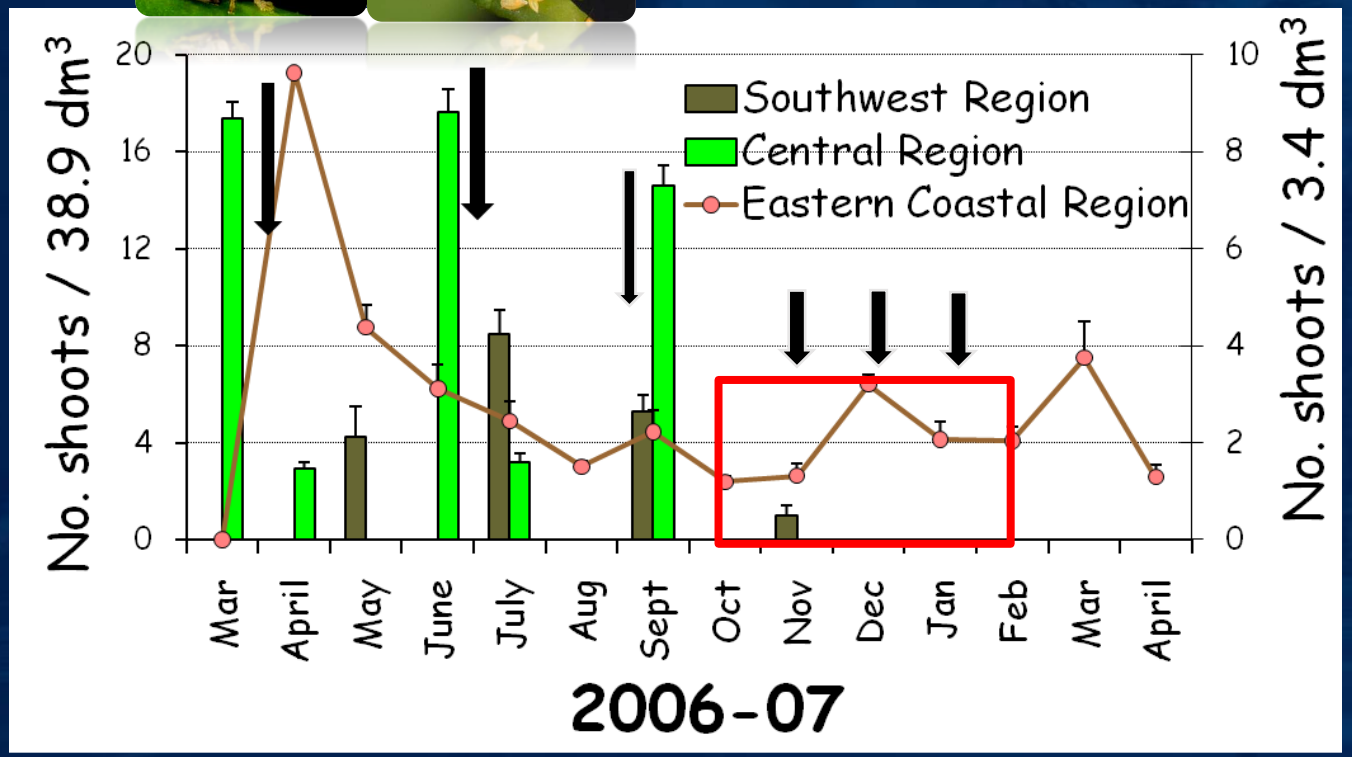
Impact of IPCs protection on tree health and production

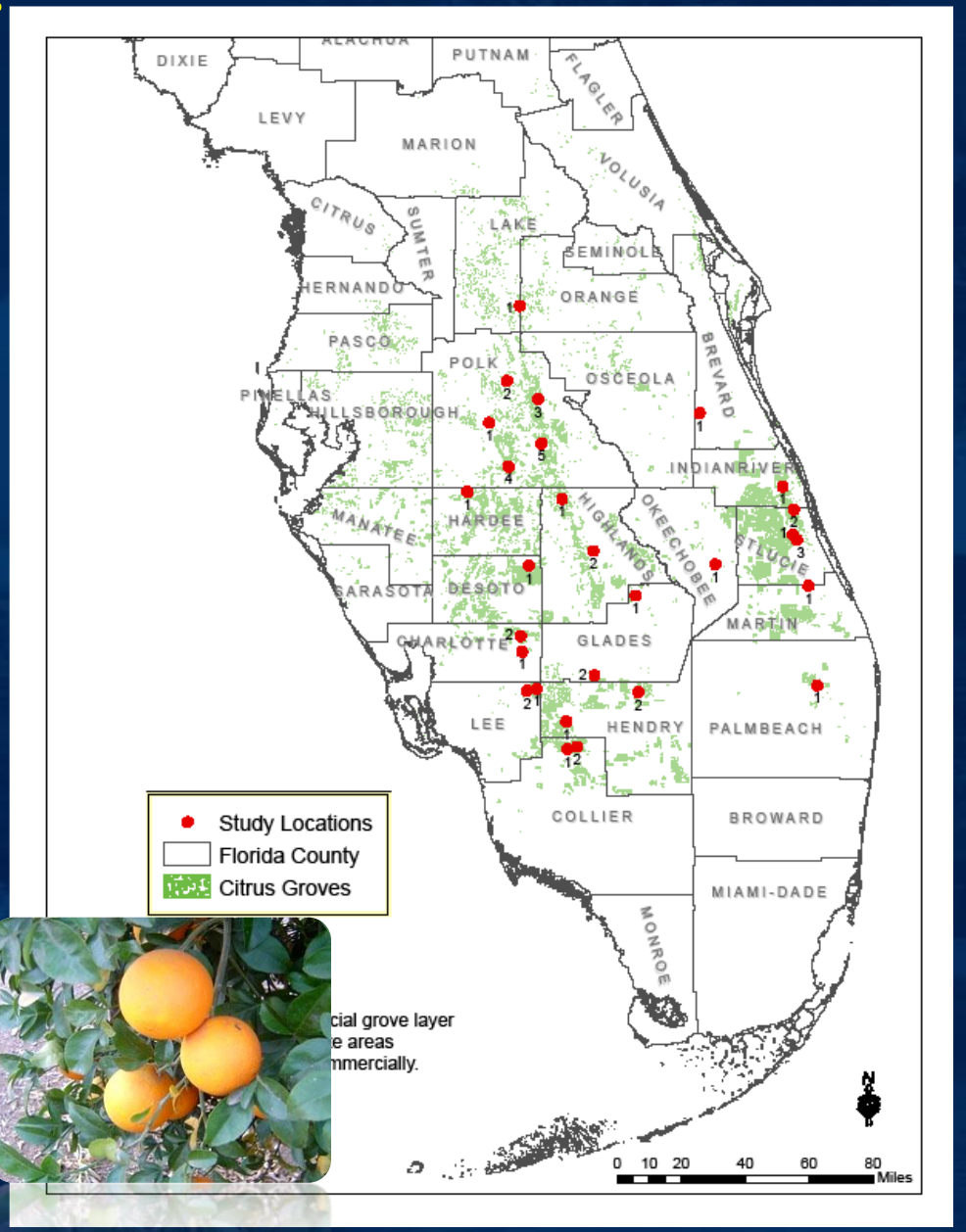
Almost three years of young tree protection from psyllid showing huge effects on tree health, fruit production and quality.

UF-SWFREC location

Citrus phenology and ACP management

Psyllids develop and reproduce in buds and young shoots





Qureshi et al. 2009, J. Econ. Entomol
Qureshi and Stansly. 2010, Crop Protection

Crop Protection 29 (2010) 860–866

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Dormant season foliar sprays of broad-spectrum insecticides: An effective component of integrated management for *Diaphorina citri* (Hemiptera: Psyllidae) in citrus orchards

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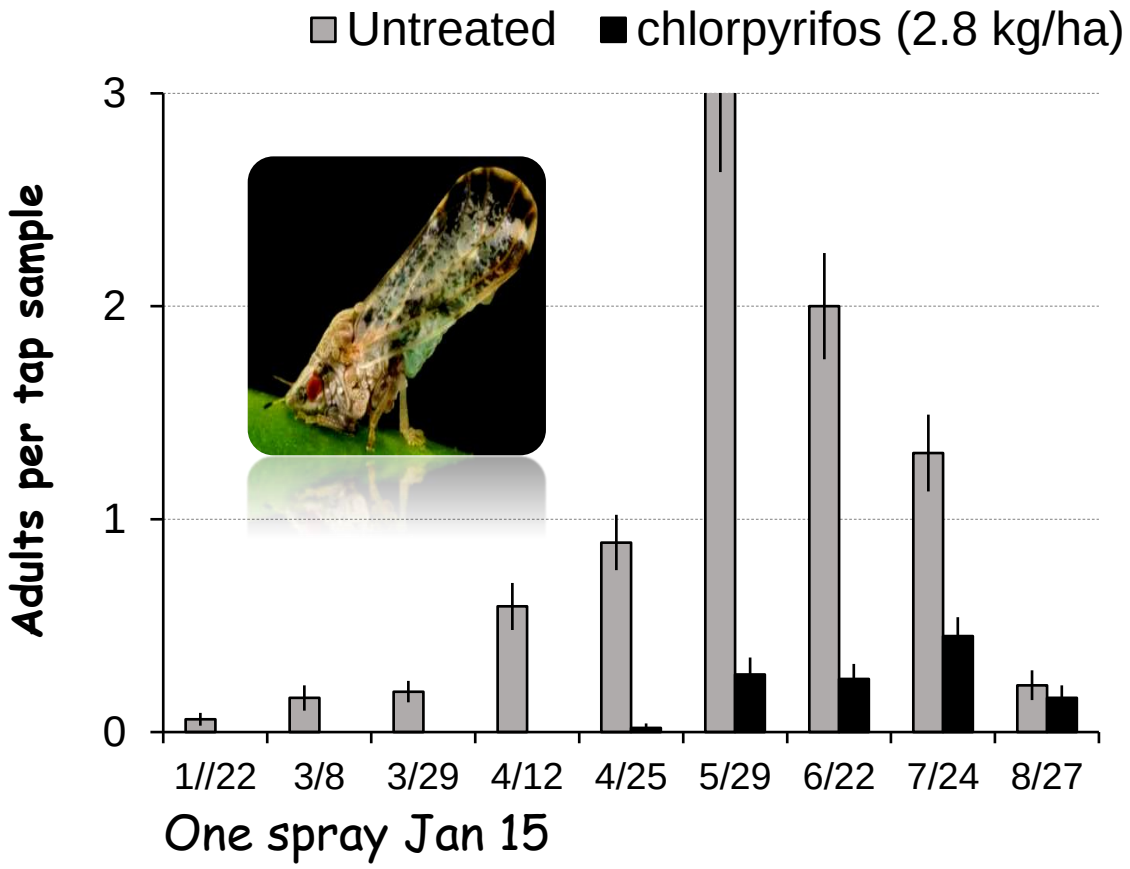
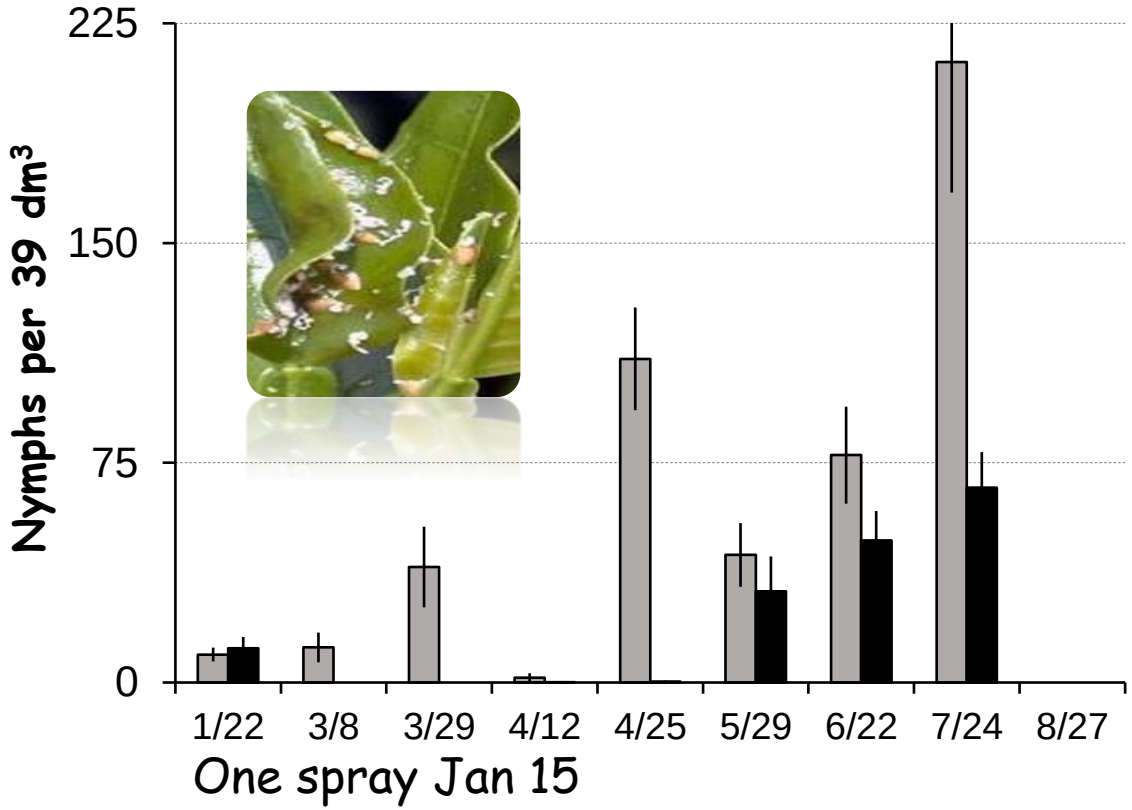
ABSTRACT

Diaphorina citri Kuwayama (Hemiptera: Psyllidae), is a global pest of citrus and vector of *Candidatus* Liberibacter, a bacteria that causes huanglongbing or greening, a devastating disease of citrus. Mature citrus trees are dormant in winter and produce most new shoots in spring, followed by sporadic canopy growth in summer and fall. Young shoots are required for oviposition and nymphal development, but adults can survive and overwinter on hardened leaves. Surviving adults reproduce in spring shoots and their progeny are probably responsible for a large portion of disease spread as they disperse to search for food. Therefore, foliar sprays of broad-spectrum insecticides applied to mature trees in winter were evaluated in a commercial citrus orchard as tactic to reduce pest populations and insecticide use in spring and summer when beneficial insects are most active. A single spray of chlorpyrifos (2.8 kg a.i. ha^{-1}) in January 2007 reduced adult psyllids an average of 10-fold over six months compared to untreated trees. The following year, differences with the untreated control averaged 15-fold for over five months following a single spray of chlorpyrifos, fenpropathrin (0.34 kg a.i. ha^{-1}), or oxamyl (1.12 kg a.i. ha^{-1}) applied in January. Spiders, lacewings and ladybeetles were equally abundant during the growing season in both treated and untreated trees both years ($P = 0.05$). Thus foliar sprays of broad-spectrum insecticides before spring growth suppressed *D. citri* for five to six months, with no detectible impact on key natural enemies. This tactic has been widely adopted to control the psyllid in Florida, in some cases area-wide. Additional sprays during the growing season should be based on scouting and targeted at adults before anticipated new flush.

Spray timing: Impact of winter/dormant season spray on ACP populations





Qureshi and Stansly. 2010, Crop Protection

Most Adult Reduction

Qureshi et al. 2014, PlosOne

Insecticide sprays

Reduction =90-100%

tolfenpyrad (Apta) (8)
chlorantraniliprole + thiamethoxam (Voliam Flexi)…
flupyradifurone (Sivanto) (13)
thiamethoxam (Actara) (10)
lamda-cyhalothrin (Warrior) (3)
beta-cyfluthrin (Baythroid) (3)
naled (Dibrom) (2)
fenpyroximate (Portal) (10)
fenpropathrin (Danitol) (8)
methidathion (Supracide) (1)
fenazaquin (Fenzak or Magus) (8)
spinetoram (Delegate) (21)
sulfoxaflor (Closer) (12)
dimethoate (Dimethoate) (1)
abamectin + thiamethoxam (Agriflex) (4)
zeta-cypermethrin (Mustang Max) (5)
chlorpyrifos (Lorsban) (8)
spirotetramat (Movento) (24)
chlorpyrifos + zeta-Cypermethrin (Stallion) (1)
Chromobacterium substugae (Grandevo/MBI-203)…
phosmet (Imidan) (7)
Burkholderia spp (MBI-206 EP) (5)
potassium salts of fatty acids (M-pede) (2)
pyridaben (Nexter)

0 20 30 40 50 60

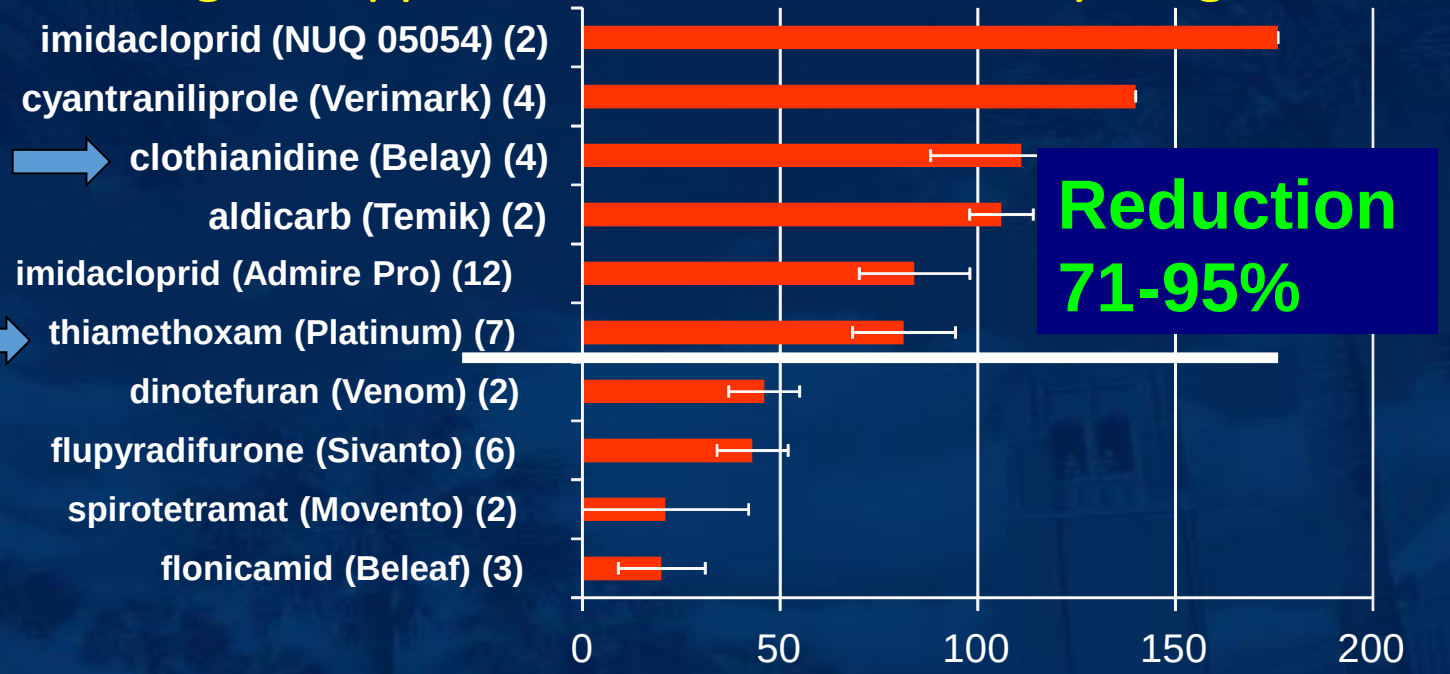
Average Days of Activity

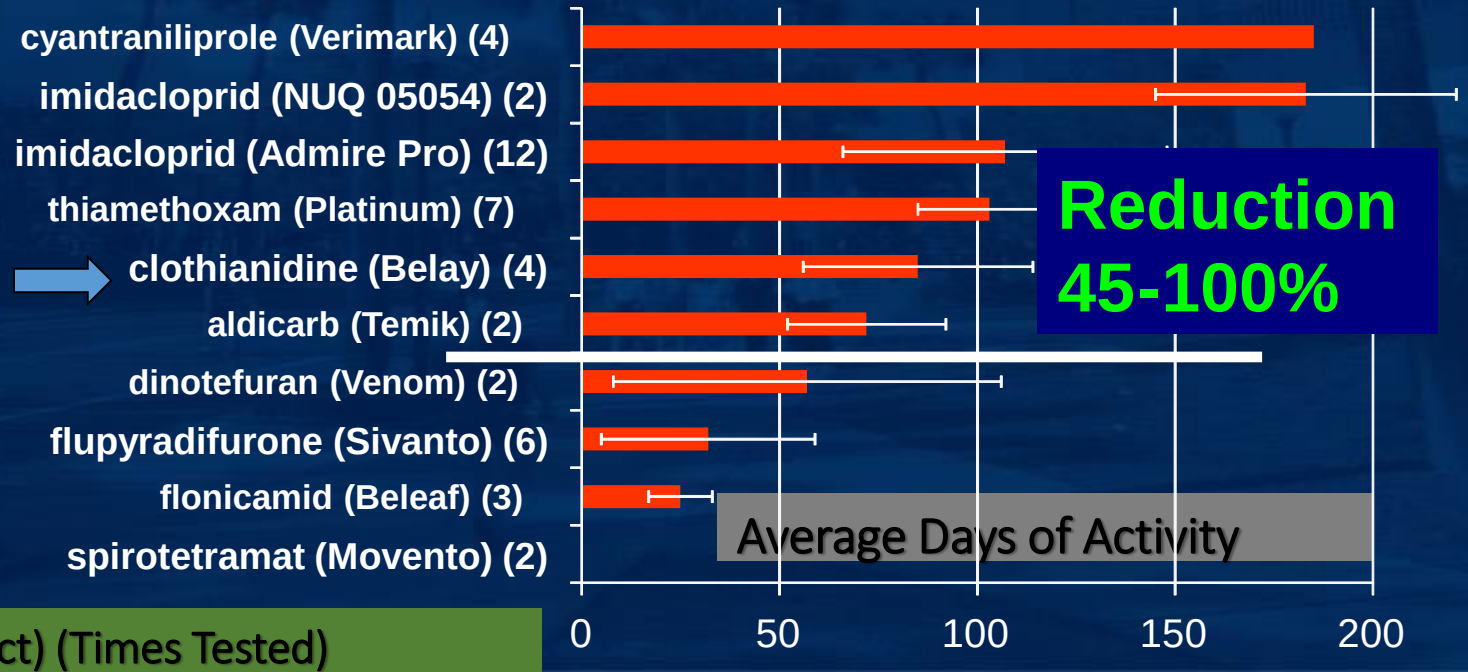
Active Ingredient (Product) (Times Tested)

Longevity of psyllid control following soil application of insecticides to young trees

Adult

Nymphs



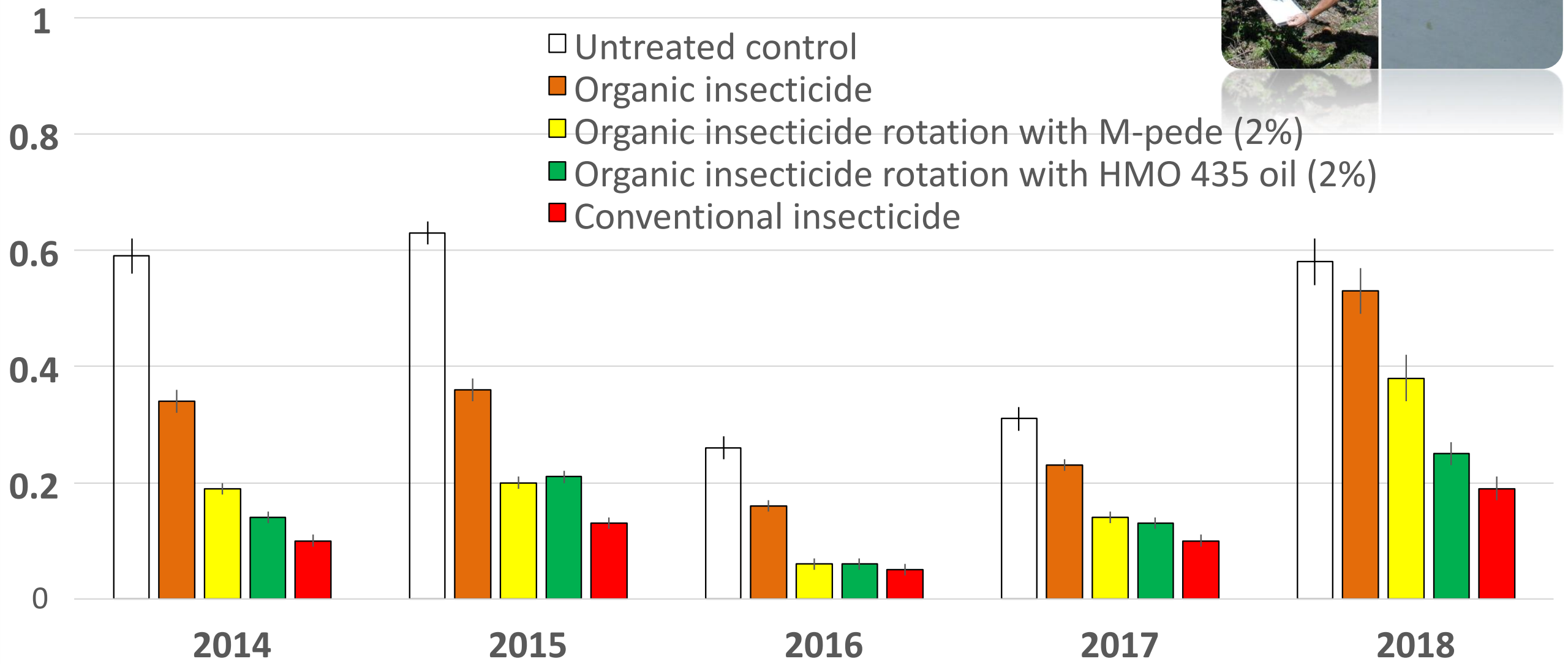


Qureshi et al. 2014, PlosOne

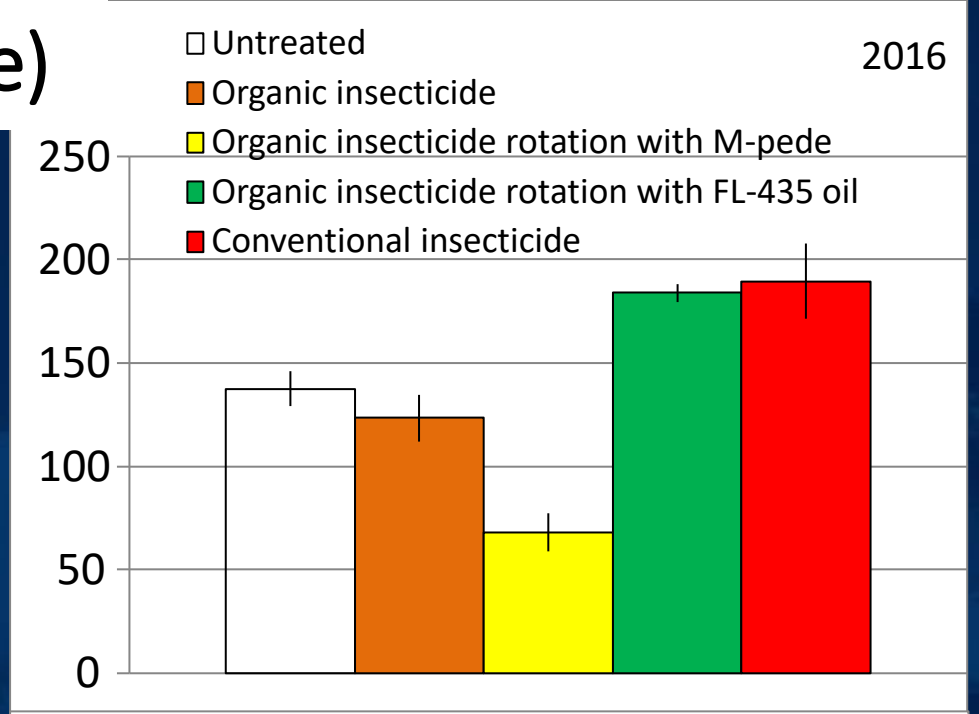
Active Ingredient (Product) (Times Tested)

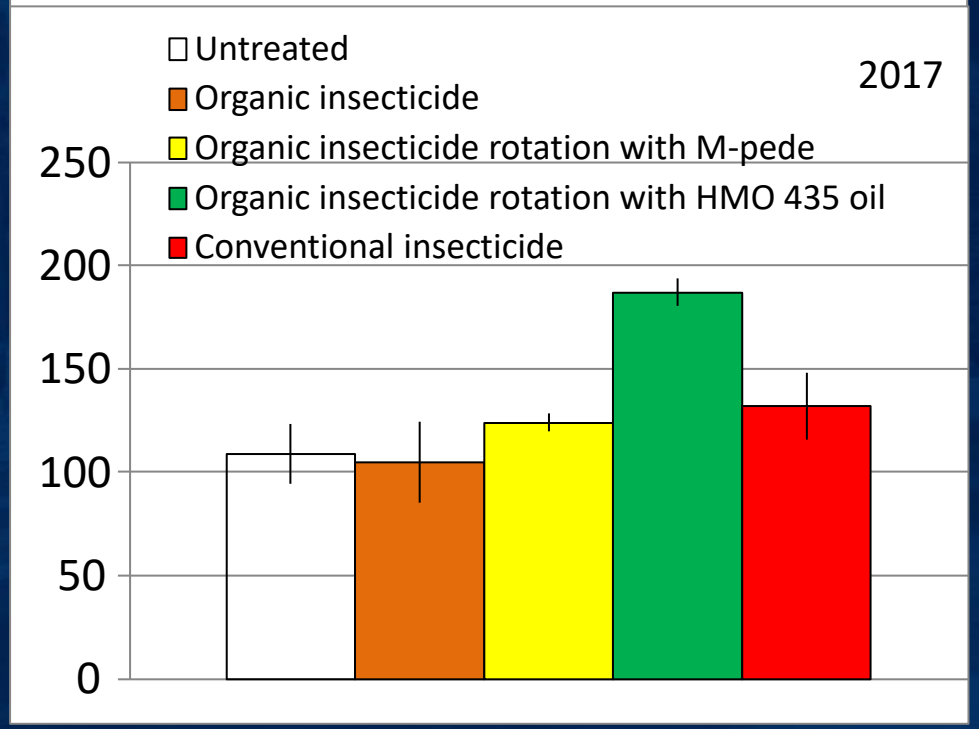
Psyllid management in mature Valencia oranges

Spray treatment threshold of 0.1 adults per tap sample



Psyllid management programs: Yield (lb/tree)



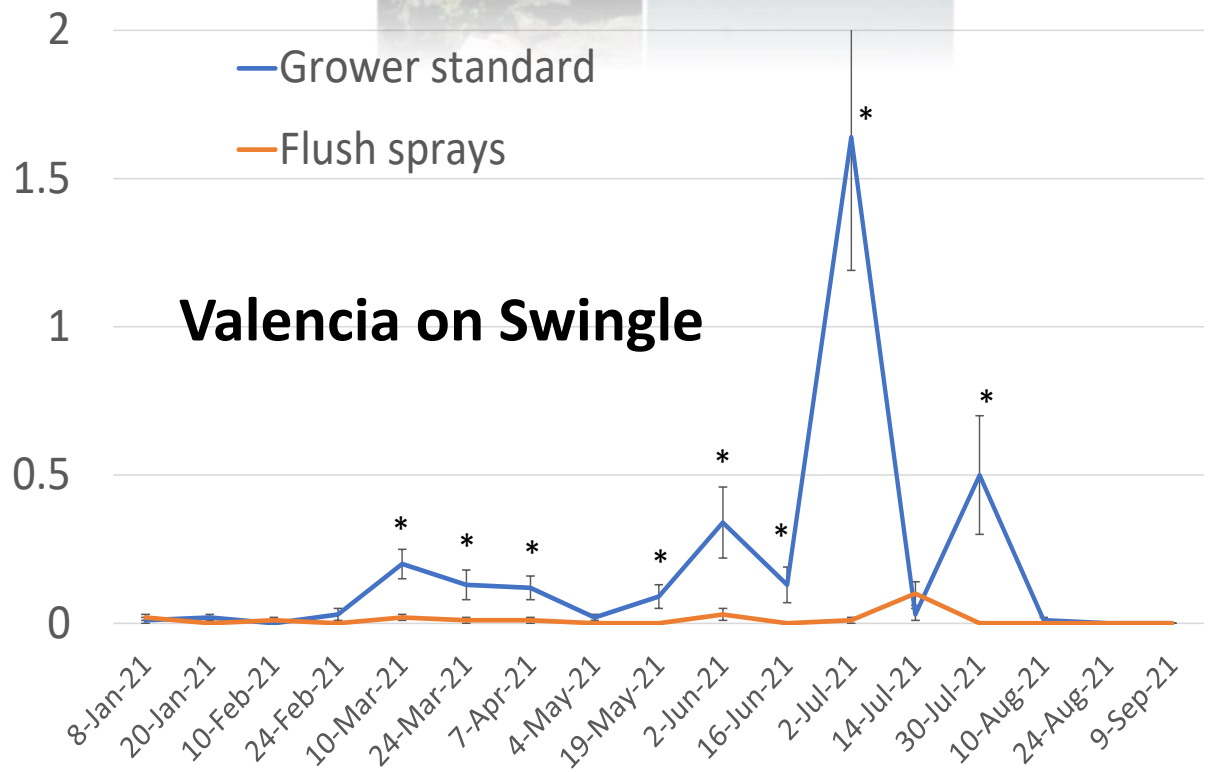


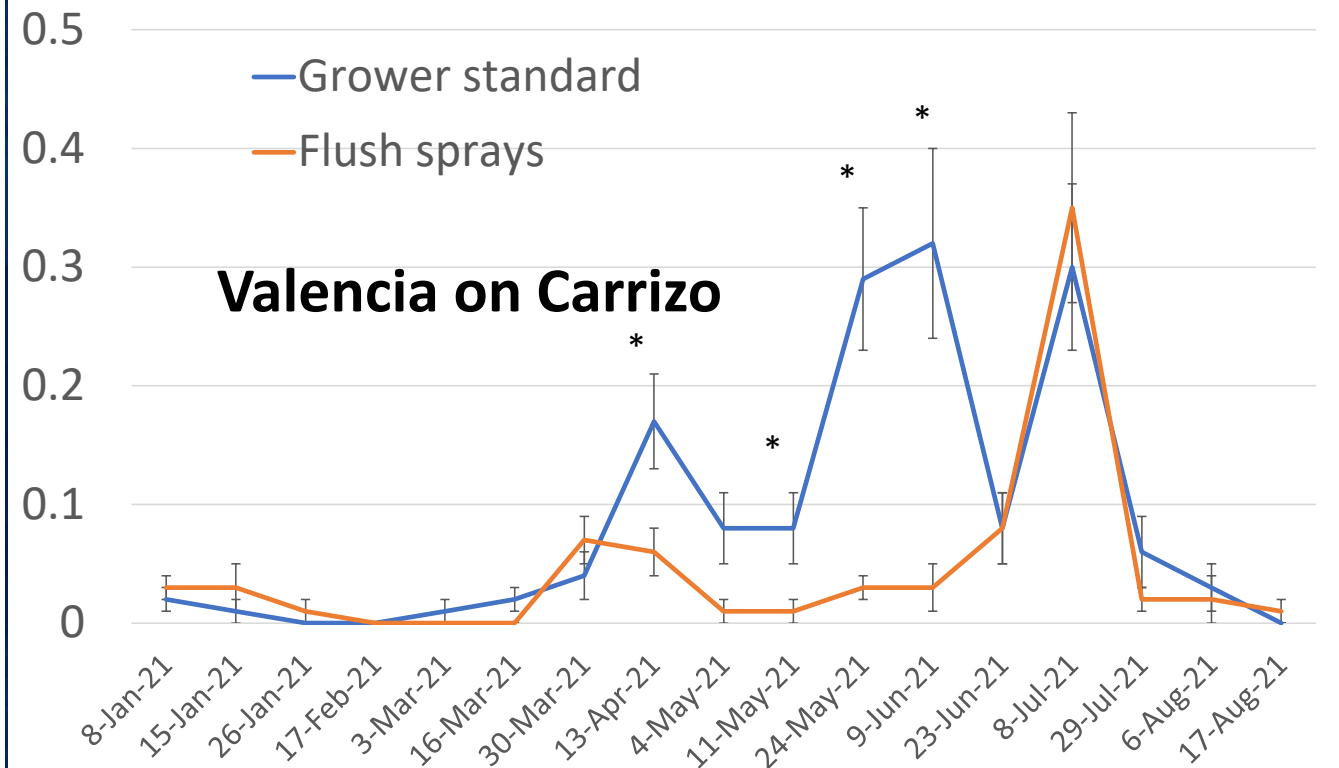
Foliar sprays of insecticides timed to citrus flushing - 2021

- Collier county
- Valencia on Swingle orange blocks
  - Flush timed sprays (ca. 70 acres)
  - Grower standard (ca. 70 acres)
- Valencia on Carrizo orange blocks
  - Flush timed sprays (ca. 140 acres)
  - Grower standard (ca. 140 acres)
- Data collection
  - Psyllid adults per tap sample
  - Eggs per shoot
  - Nymphs per shoot

Psyllid populations: Adults per tap sample

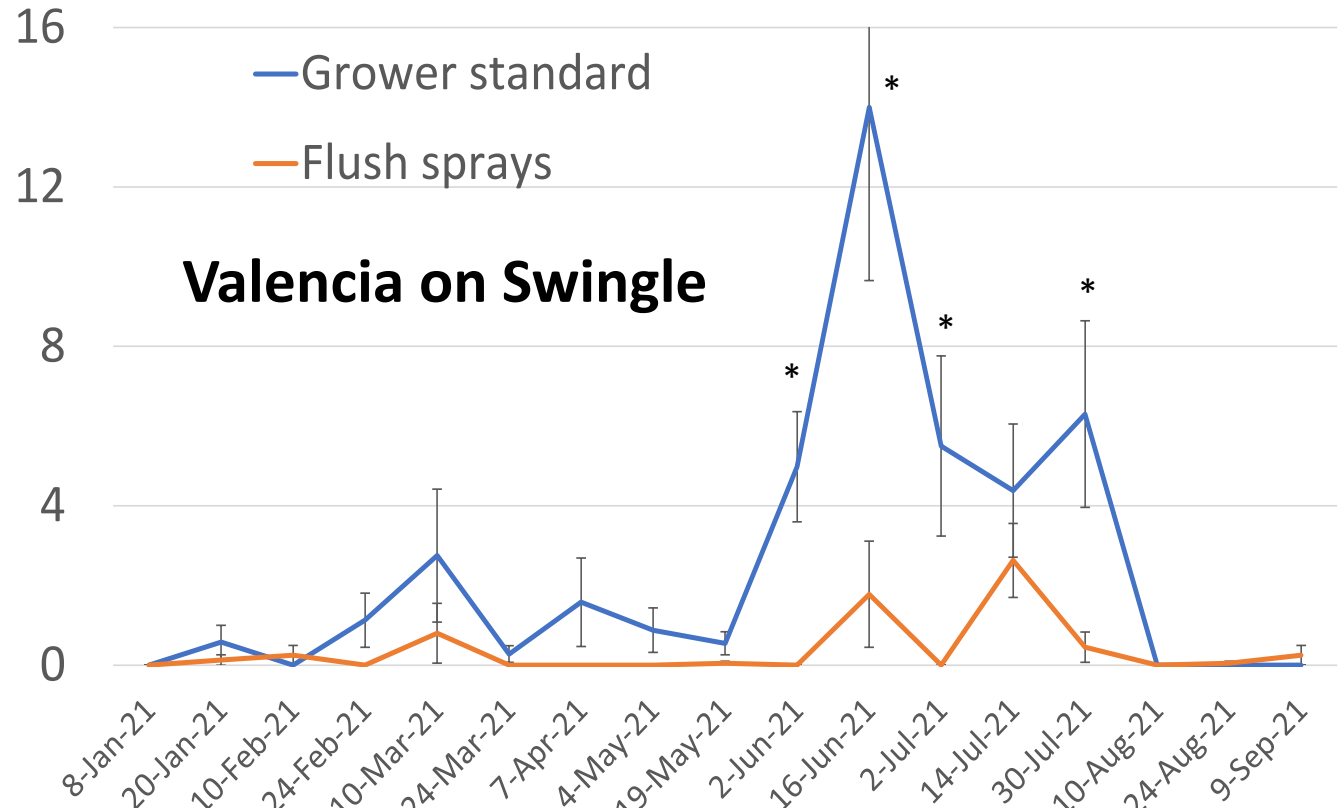
Grower standard	Flush sprays
January: Danitol	January: Danitol
April: Movento	April: Portal
June: Agri-Flex + Agri-Mek	June: Exirel
August: Minecto Pro	July: Delegate
September: Apta	September: Apta

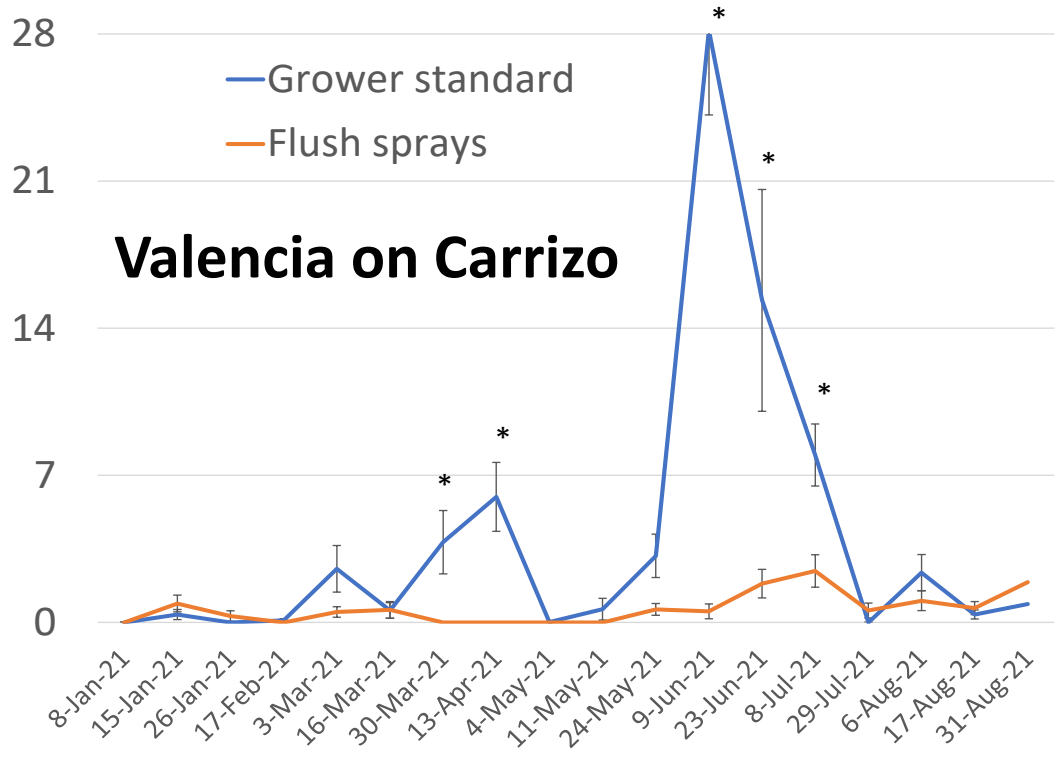




Psyllid populations: Eggs per shoot

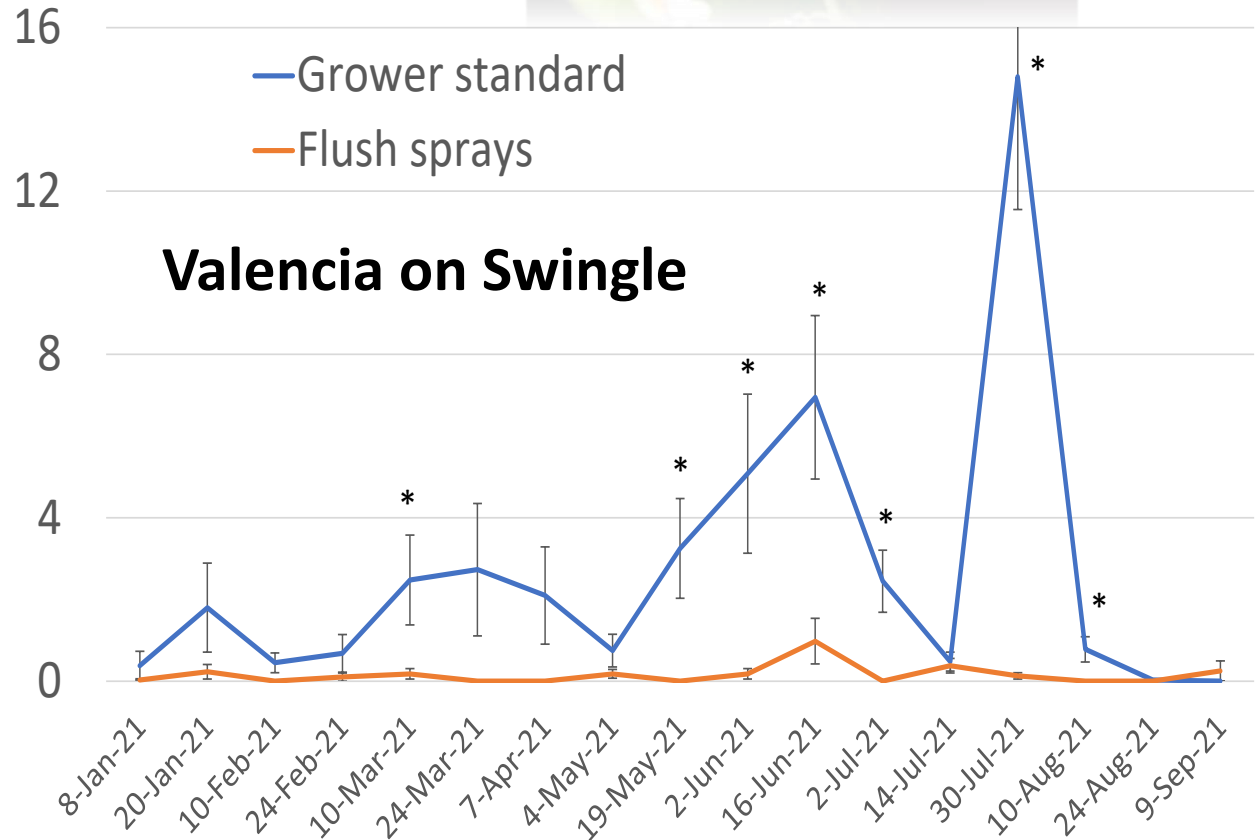
Grower standard	Flush sprays
January: Danitol	January: Danitol
April: Movento	April: Portal
June: Agri-Flex + Agri-Mek	June: Exirel
August: Minecto Pro	July: Delegate
September: Apta	September: Apta

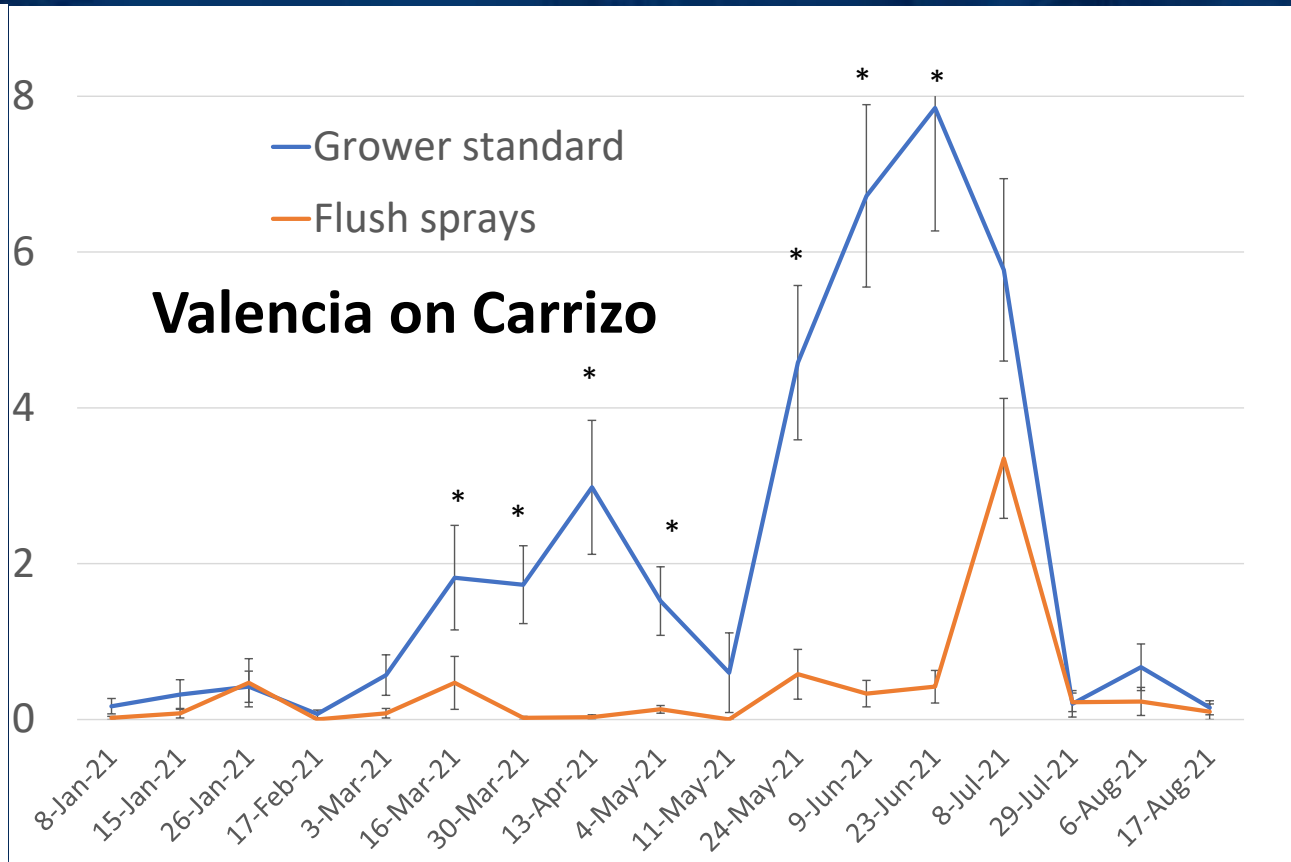




Psyllid populations: Nymphs per shoot

Grower standard	Flush sprays
January: Danitol	January: Danitol
April: Movento	April: Portal
June: Agri-Flex + Agri-Mek	June: Exirel
August: Minecto Pro	July: Delegate
September: Apta	September: Apta





Conclusions and Implications

- IPCs and CUPS protected citrus from ACP/HLB. However, other pests such as citrus leafminer, scales, thrips, mealybugs, armyworms, and mites were detected in these structures.
- Significant effects of organic insecticides and 435 oil on ACP control and yield provide pest management opportunities for organic growers and potential for use of IPM in citrus. Reduced use of conventional insecticides help to conserve and augment biological control, and reduce secondary pest outbreaks, pesticide resistance and residue issues.
- Foliar sprays of insecticides timed to citrus flushing provided a significant reduction in psyllid populations than the grower standard.
- Pest monitoring is critical for both protected and traditional open production systems for timely decisions on management.

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