Asian citrus psyllid management and current findings of recent surveys

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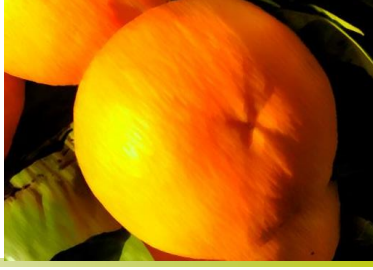
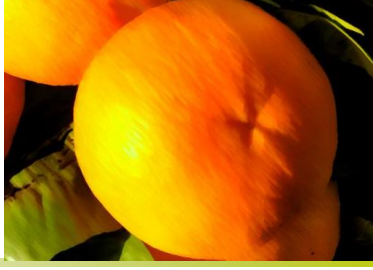
Objectives



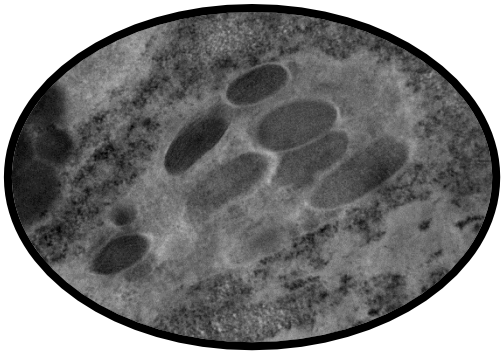
- Learn to recognize Asian citrus psyllid and Huanglongbing symptoms
- Learn how to sample for psyllids
- Know what to do if you find psyllids in your grove

The Asian citrus psyllid



- *Diaphorina citri*, the Asian citrus psyllid. First found in Florida June 1998

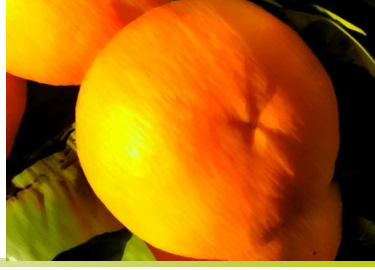
- Vector of *Candidatus* Liberibacter asiaticus (CLas) pathogen responsible for Huanglongbing (HLB)

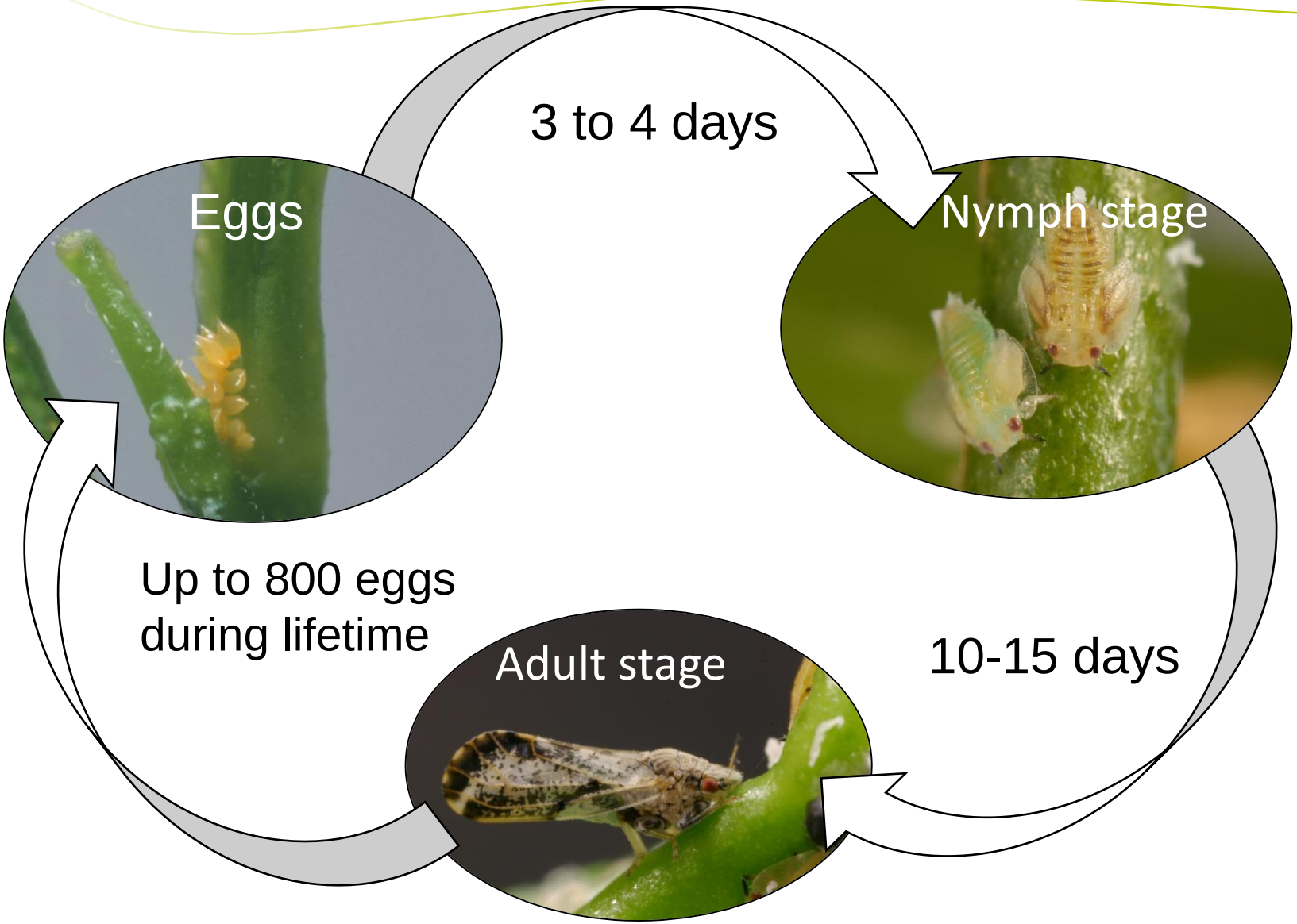


Candidatus Liberibacter asiaticus

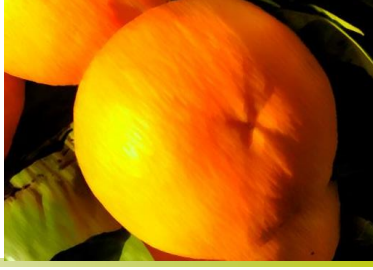
Uninfected

The Asian citrus psyllid: Life Cycle



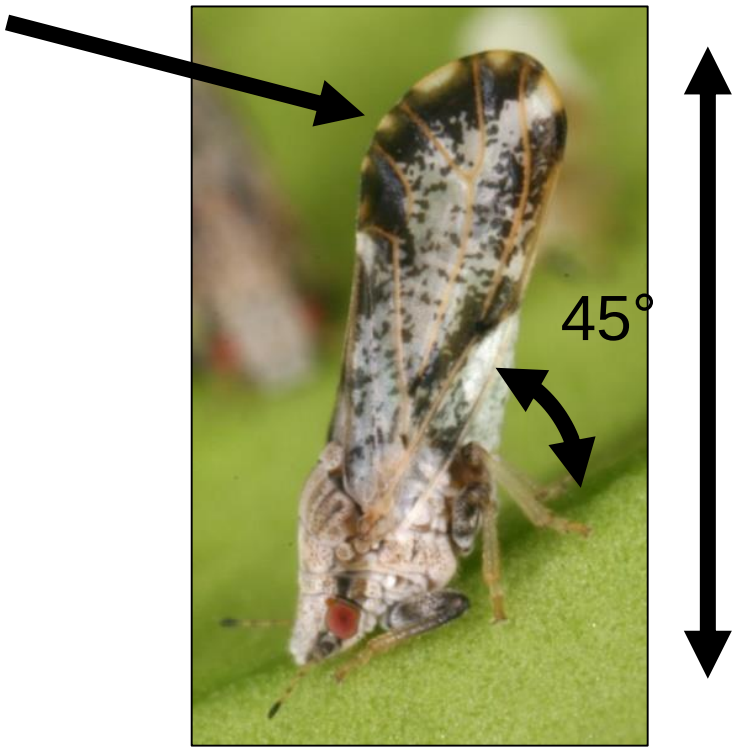


The Asian citrus psyllid



- Adults jump when approached
- They sit in a vertical position with abdomen up in the air

Black coloration at the end of the wings



1/10 to 1/6 inches

- Nymphs are always found on new emerging leaves.
- Can be confused with scale insects, but scale insects do not move and do not produce white honeydew.

HLB symtoms

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Lovestrand E. 2016

Citrus plant in Carabelle, FL. Note the asymmetrical chlorosis on the leaves.

Citrus tree in Carabelle, FL. Note the leaf mottle and shape and color of the fruit.

UF/IFAS

Lovestrand E. 2016

Leaf vein corking symptom.

Leaves can become thicker, with veins enlarged and corky in appearance

Citrus hystrix tree showing severe vein corking symptom.

UF IFAS NFREC

Iriarte F.

Fruit is usually small, poorly colored, lopsided and may have lack of coloration at the stylar end

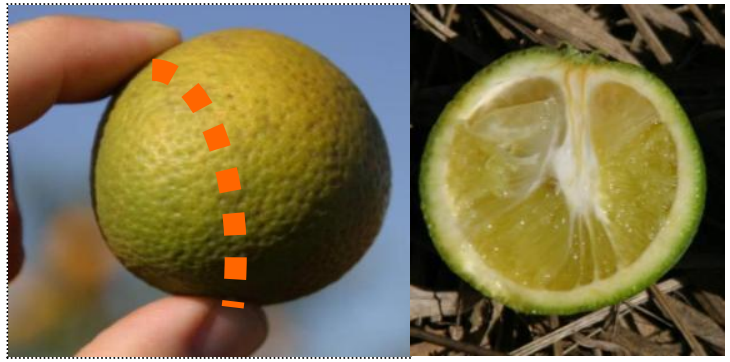
Infected fruits have stylar end “lack of coloration” .

Fruit taste may be bitter, medicinal and sour.

Infected trees may not show symptoms for several years (1 to 5 years or more).

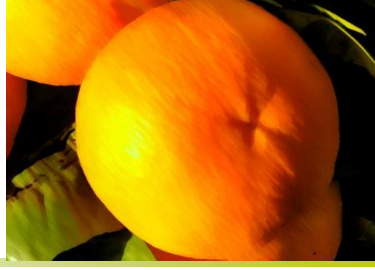
Asymmetrical “lopsided” sweet orange fruit from São Paulo, Brazil.

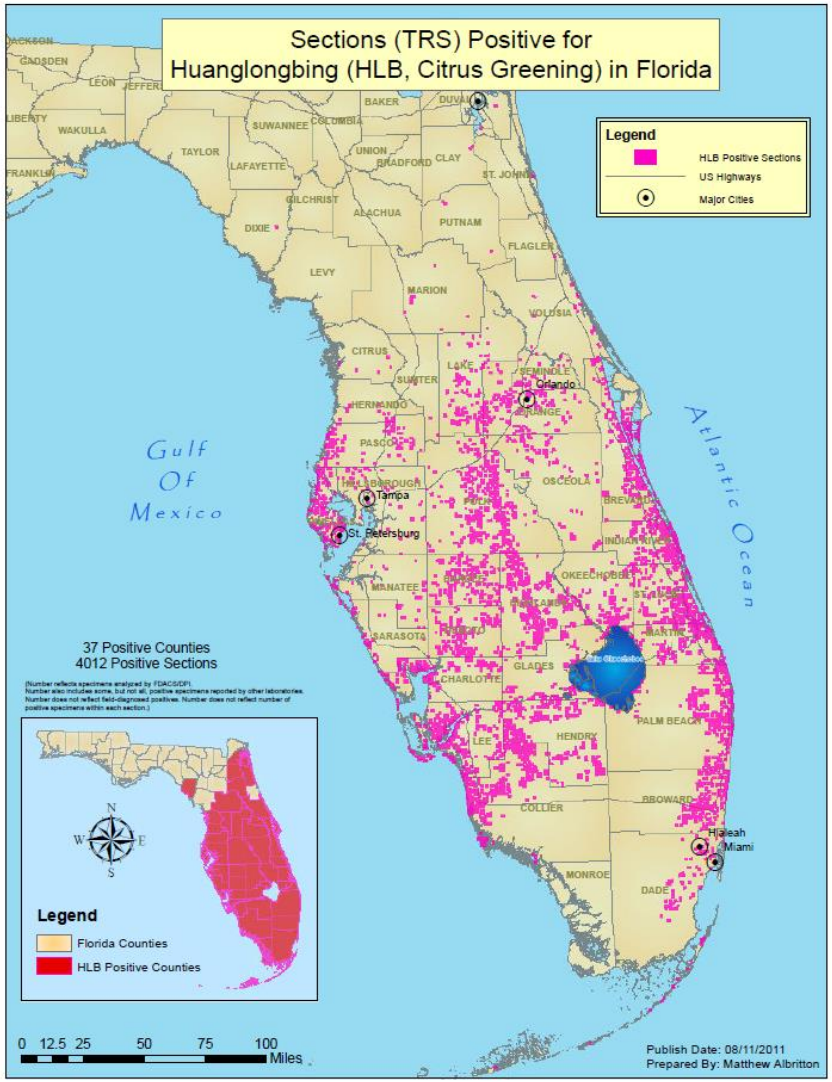
Economic impact of HLB in Florida



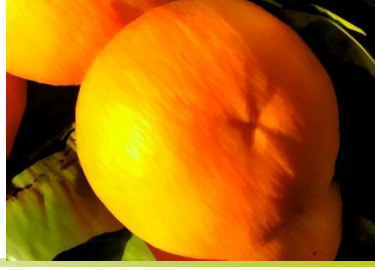
- Death of citrus trees only a few years after infection
- Undesirable organoleptic properties
- All known commercial citrus species are susceptible to HLB infection
- Citrus yield decreased from 133.6 millions of boxes in 2012-2013 to 81.4 millions of boxes in 2015-2016
- HLB infection rate in Florida is approximately 80%

Distribution of HLB in Florida





Records of Asian Citrus psyllid in the Northwest district



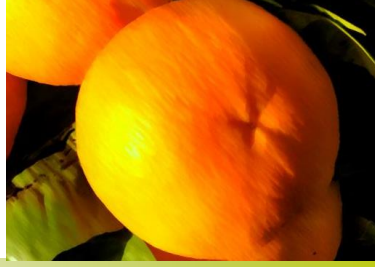
HLB trees

Asian citrus psyllids reported (Since March 2017)

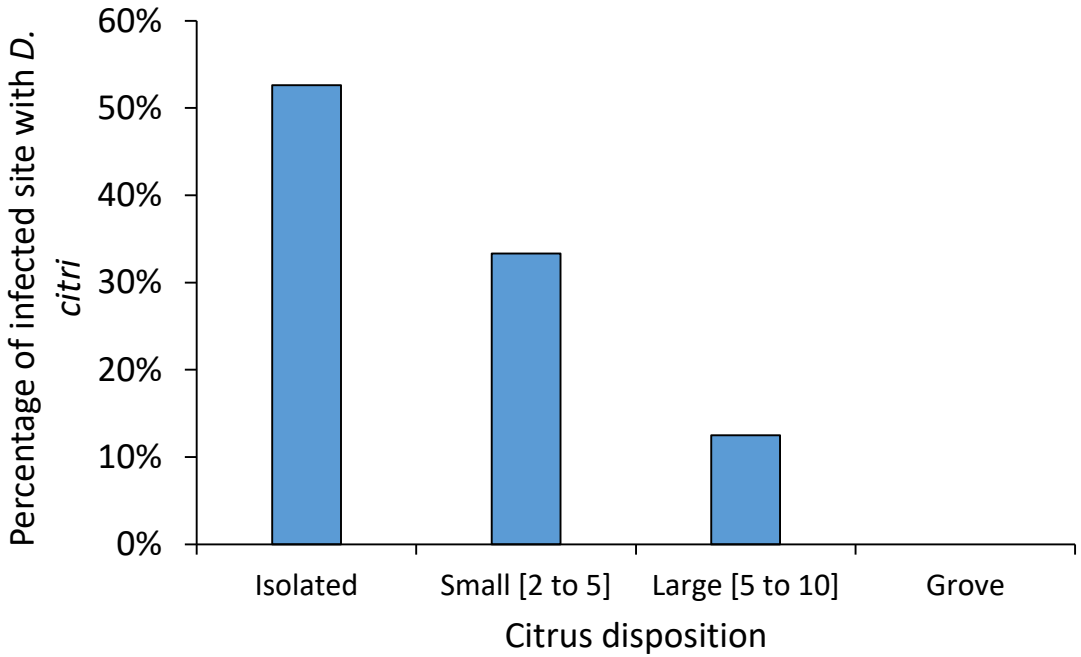
No psyllid

First case of HLB in Franklin County

Records of Asian Citrus psyllid in the Northwest district

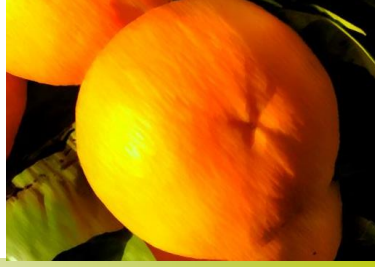


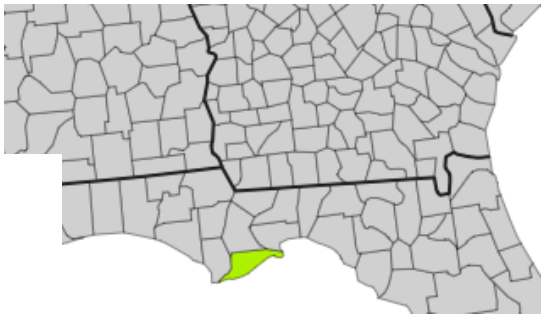
Where did we found these psyllids?

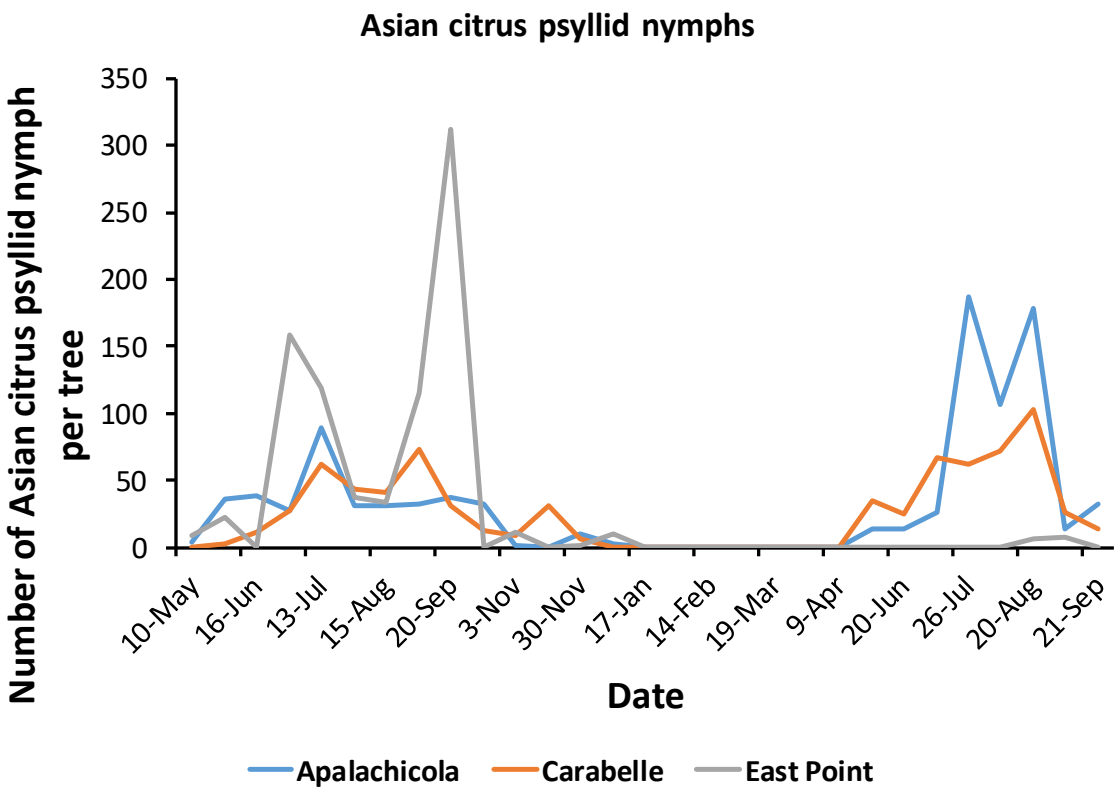


Infestation of Asian citrus psyllid start with backyard citrus and isolated citrus.

Population dynamic of the Asian citrus psyllid in Franklin county

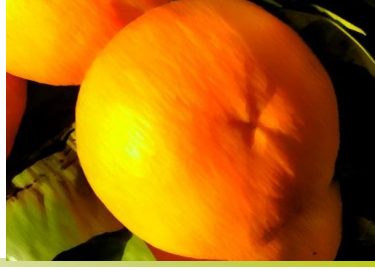


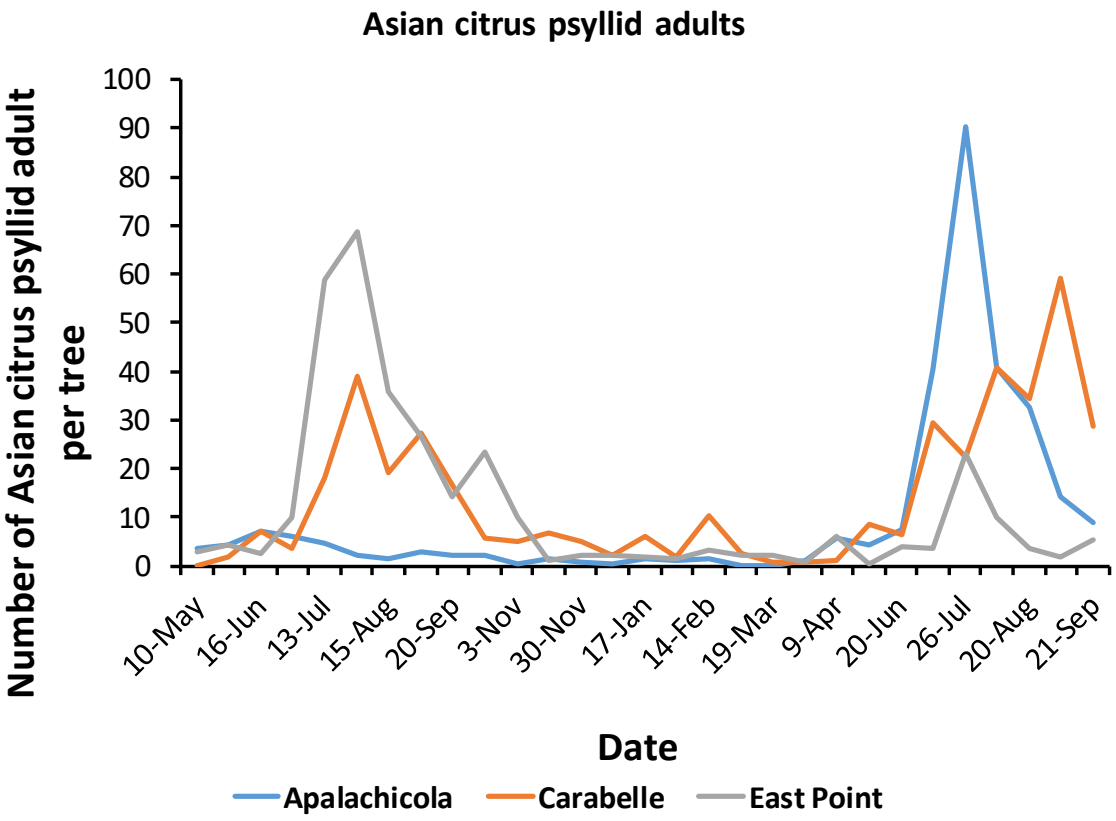


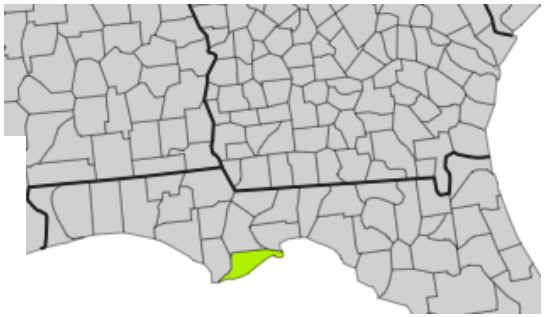


Nymph population peaks between September to November

Population dynamic of the Asian citrus psyllid in Franklin county

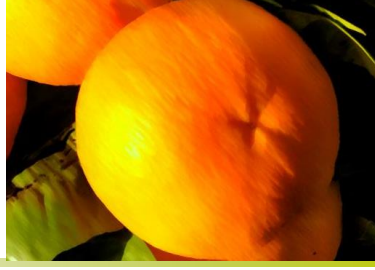


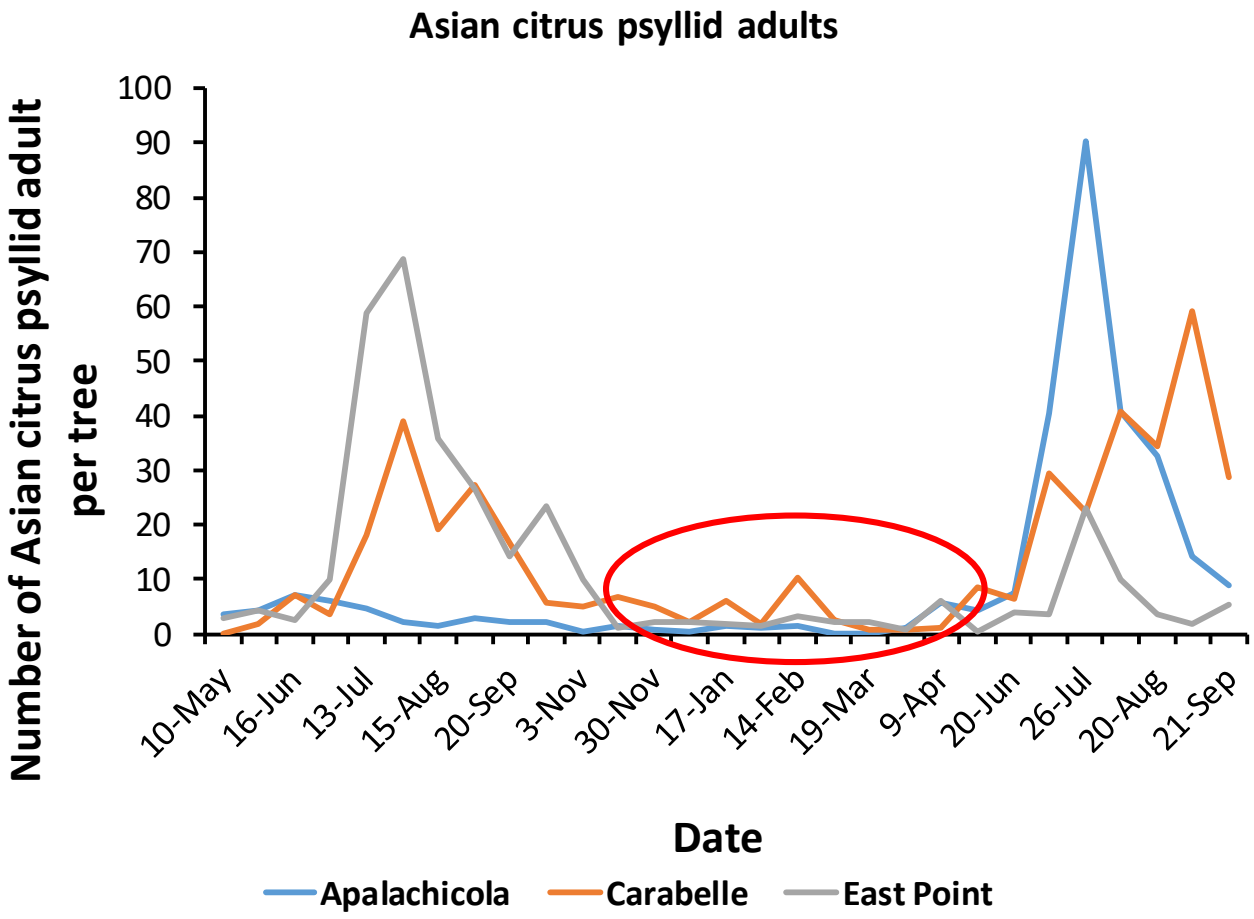


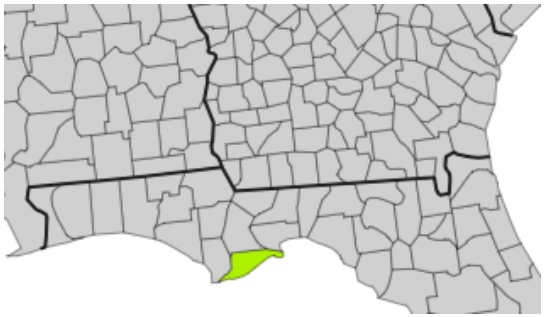


Adult population peaks between June and October

Survival of the Asian citrus psyllid in Franklin county during 2018 winter

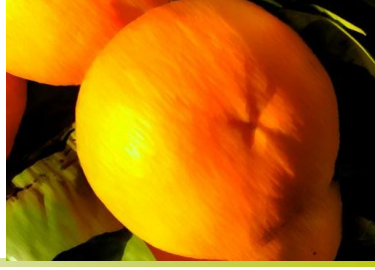






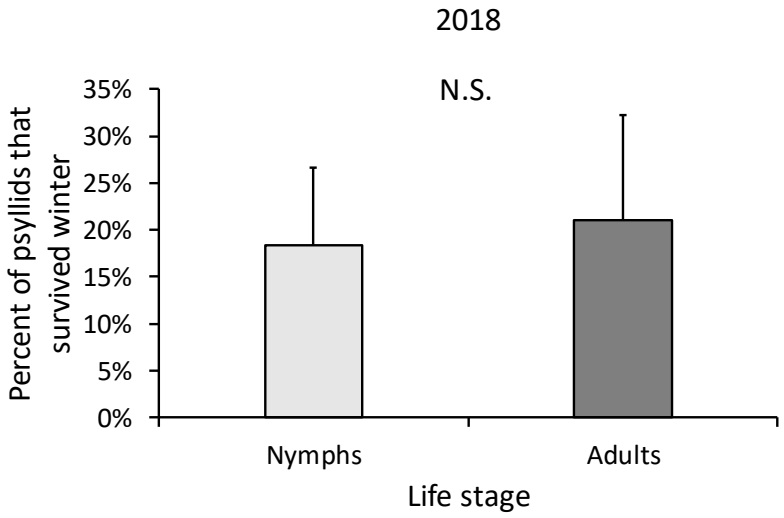
Asian citrus psyllids survived 2018 winter

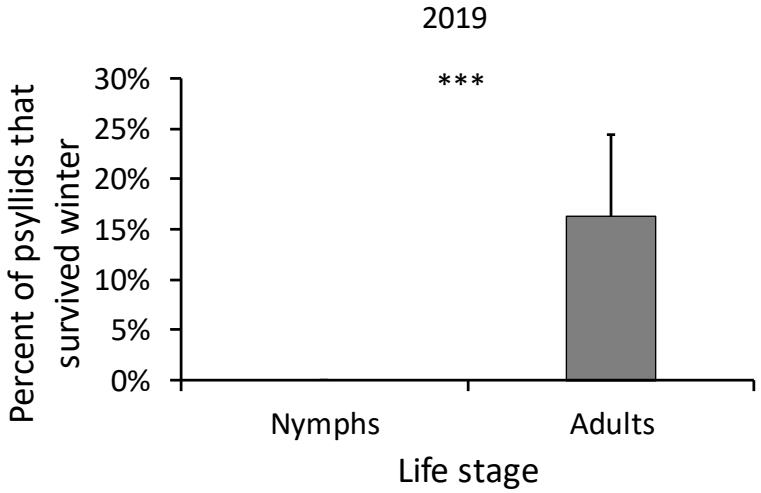
Survival of the Asian citrus psyllid in Franklin county during 2018 winter



Cage experiments :
20 adults cages on citrus branches in November 2017 & 2018 – Counted survivor in March 2018 & 2019
Count the number of psyllid nymphs in November 2017 & 2018 – Counted survivor in March 2018 & 2019

18% of psyllid survived winter 2018 in Franklin County
16.25% of adult psyllids survived winter 2019 in Franklin County

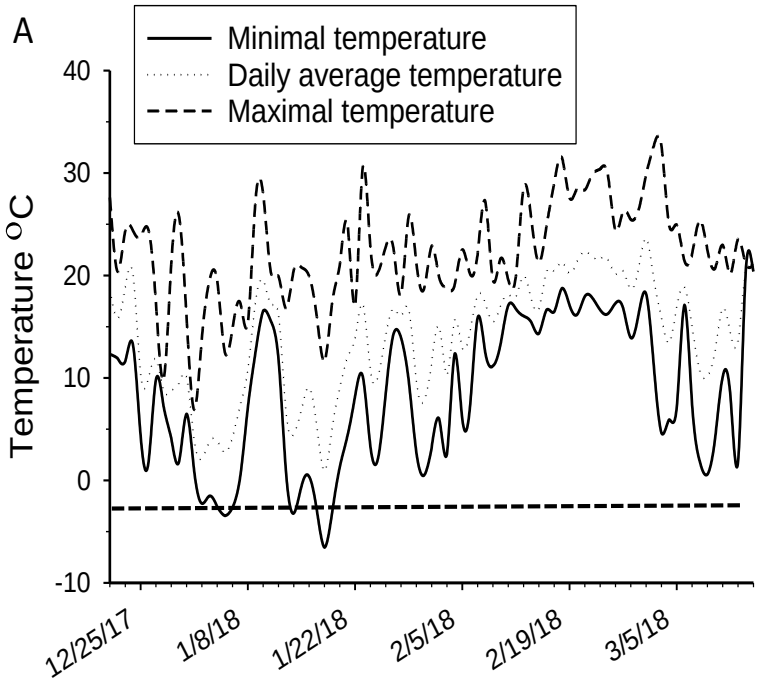


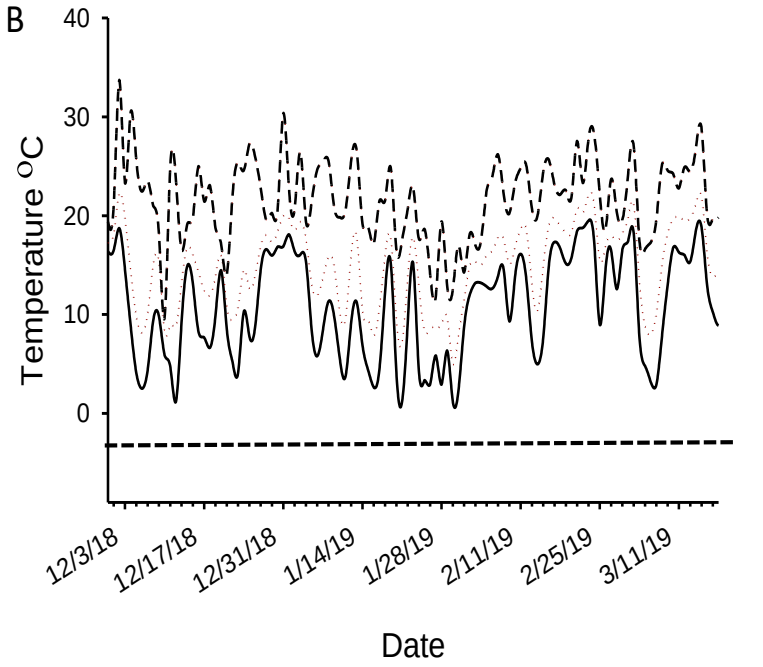


Overwintering capabilities

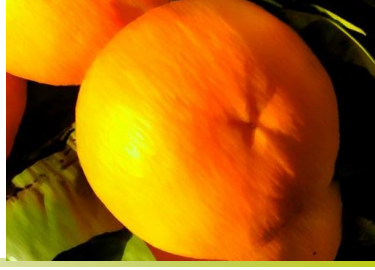
50% mortality 0° C (32° F) for 2 days

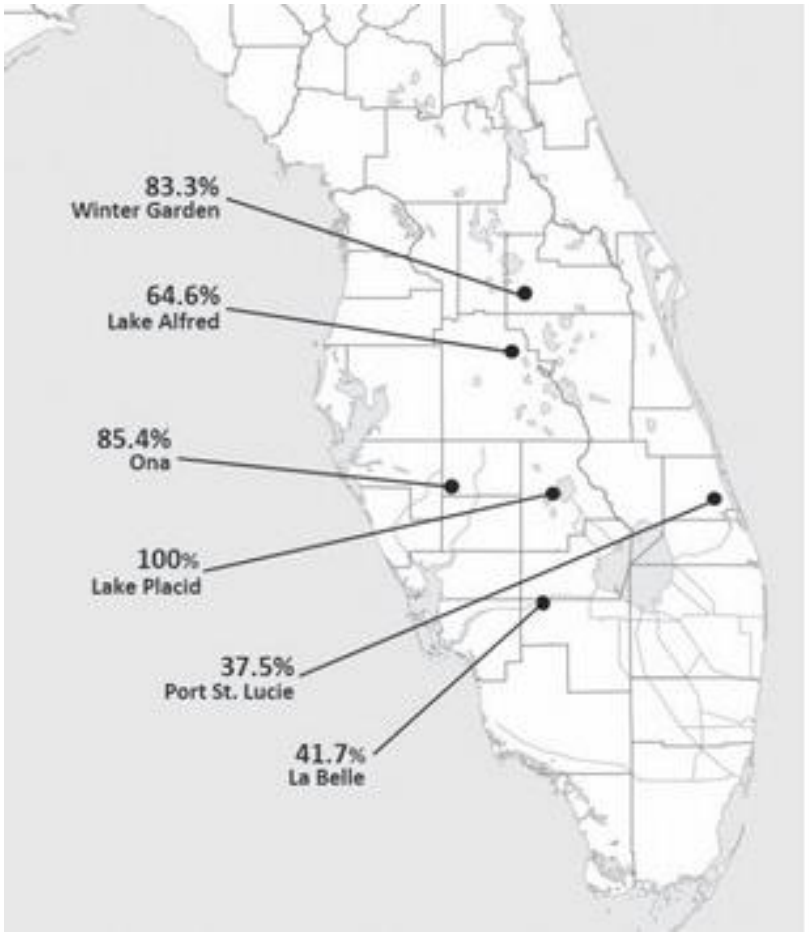
95% mortality for 7 hours at -4.5° C (23.9° F) to 2 hours at -9.2° C (15.4° F)





Percentage of Psyllids carrying HLB pathogen





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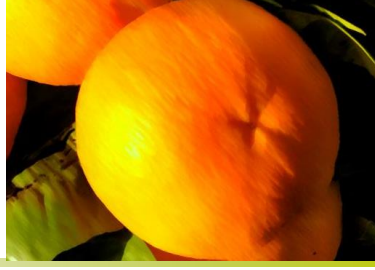
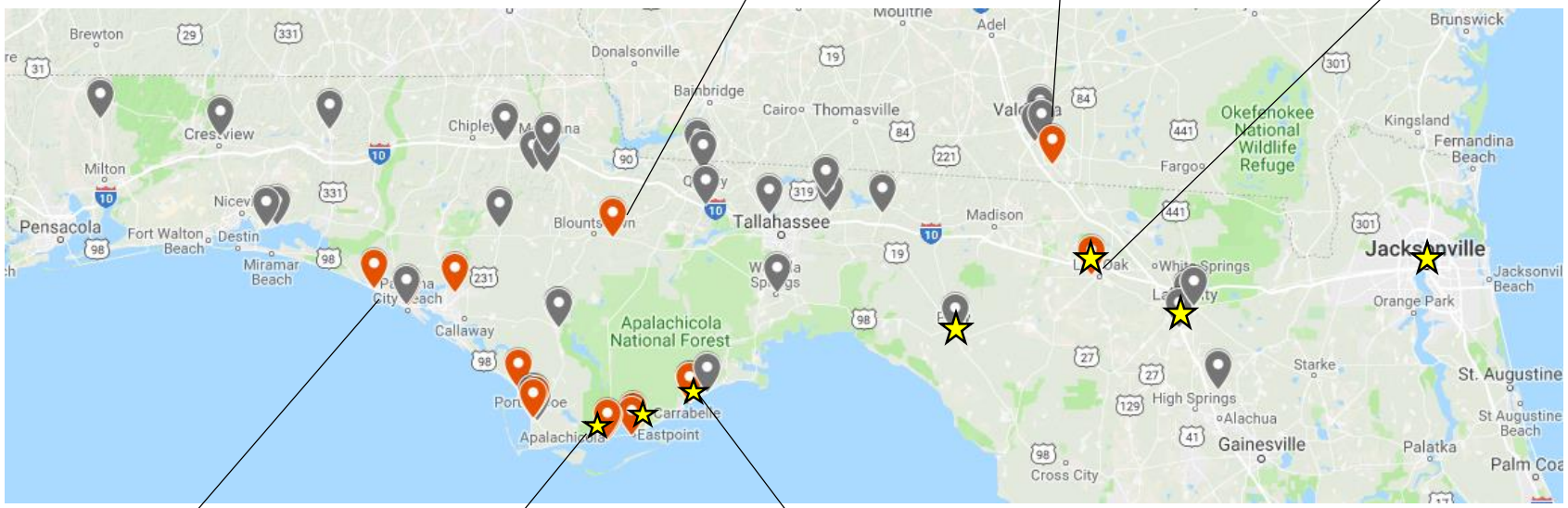
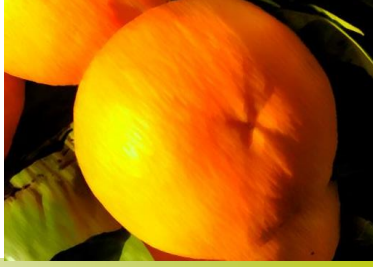
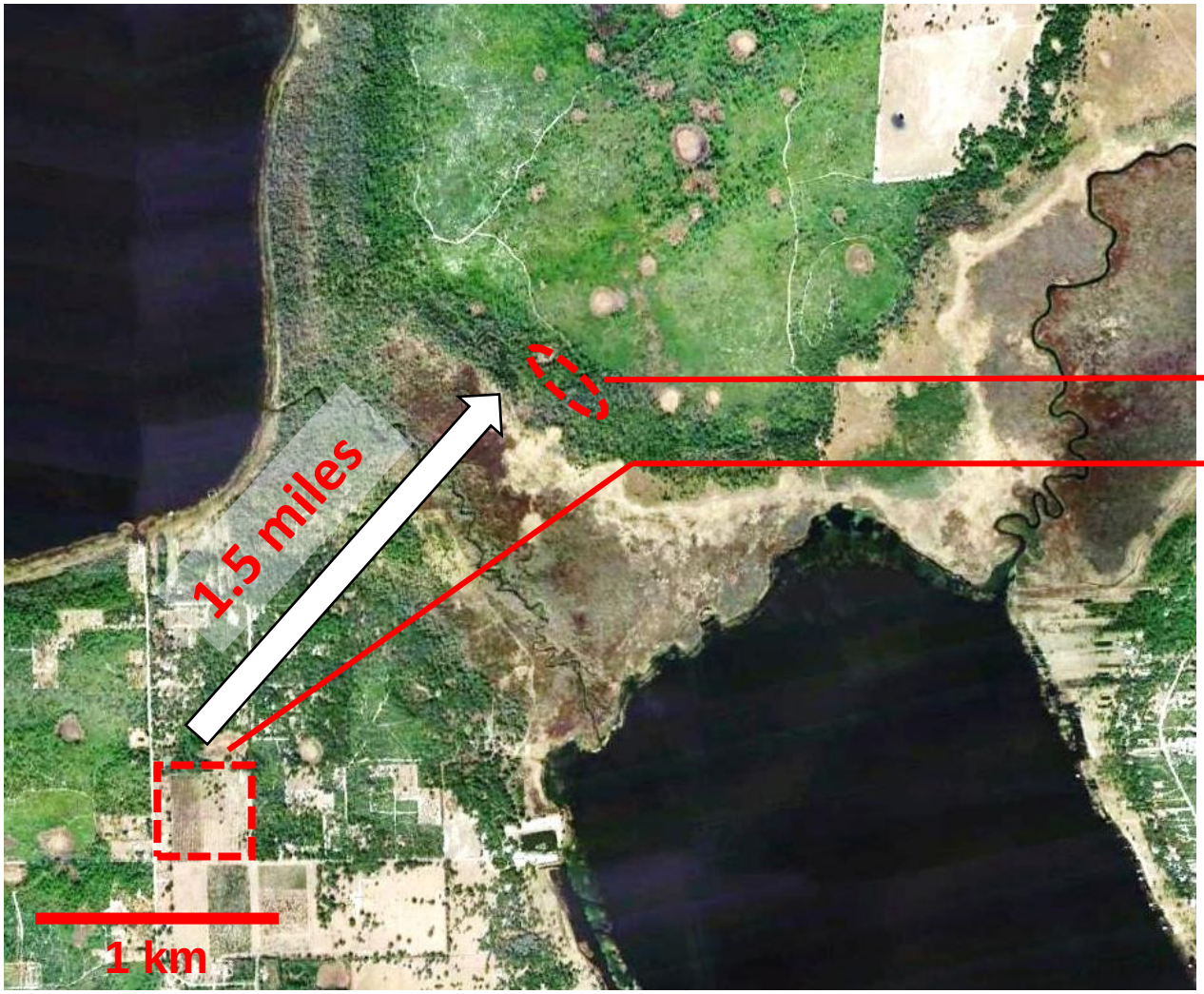


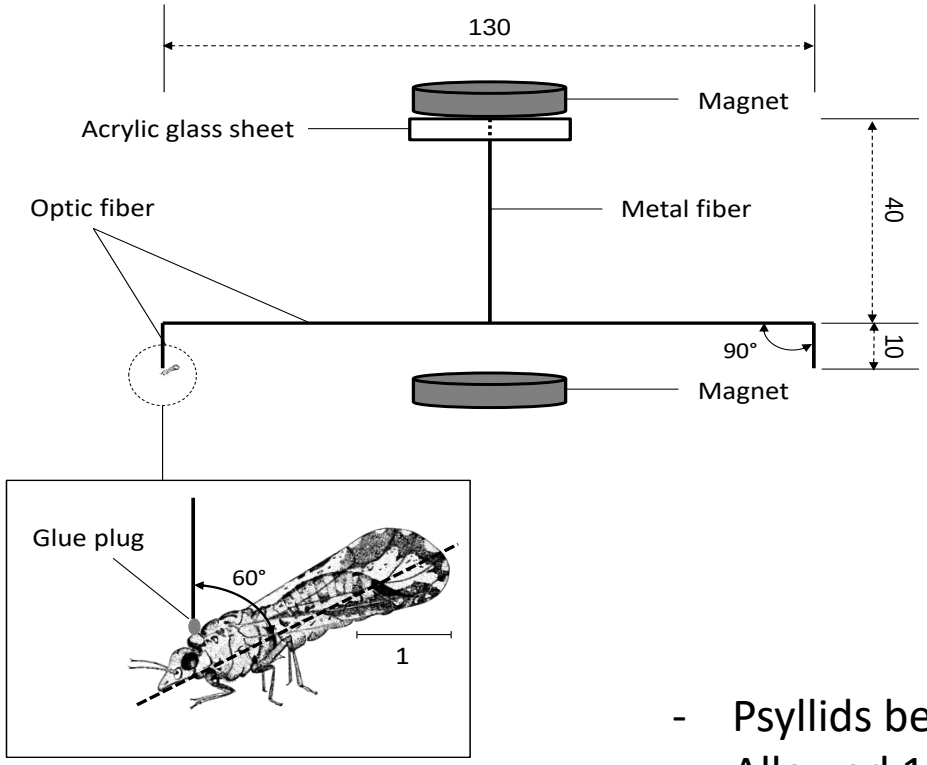


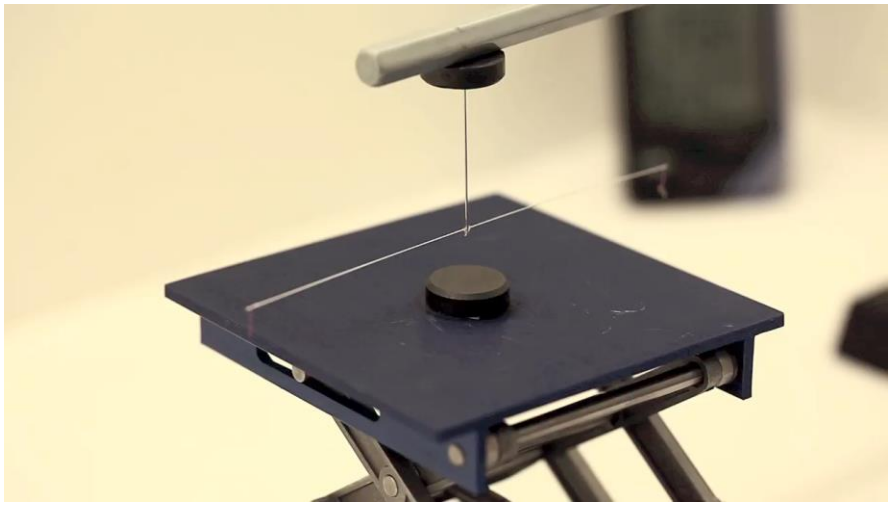
Dispersion potential of *D. citri*





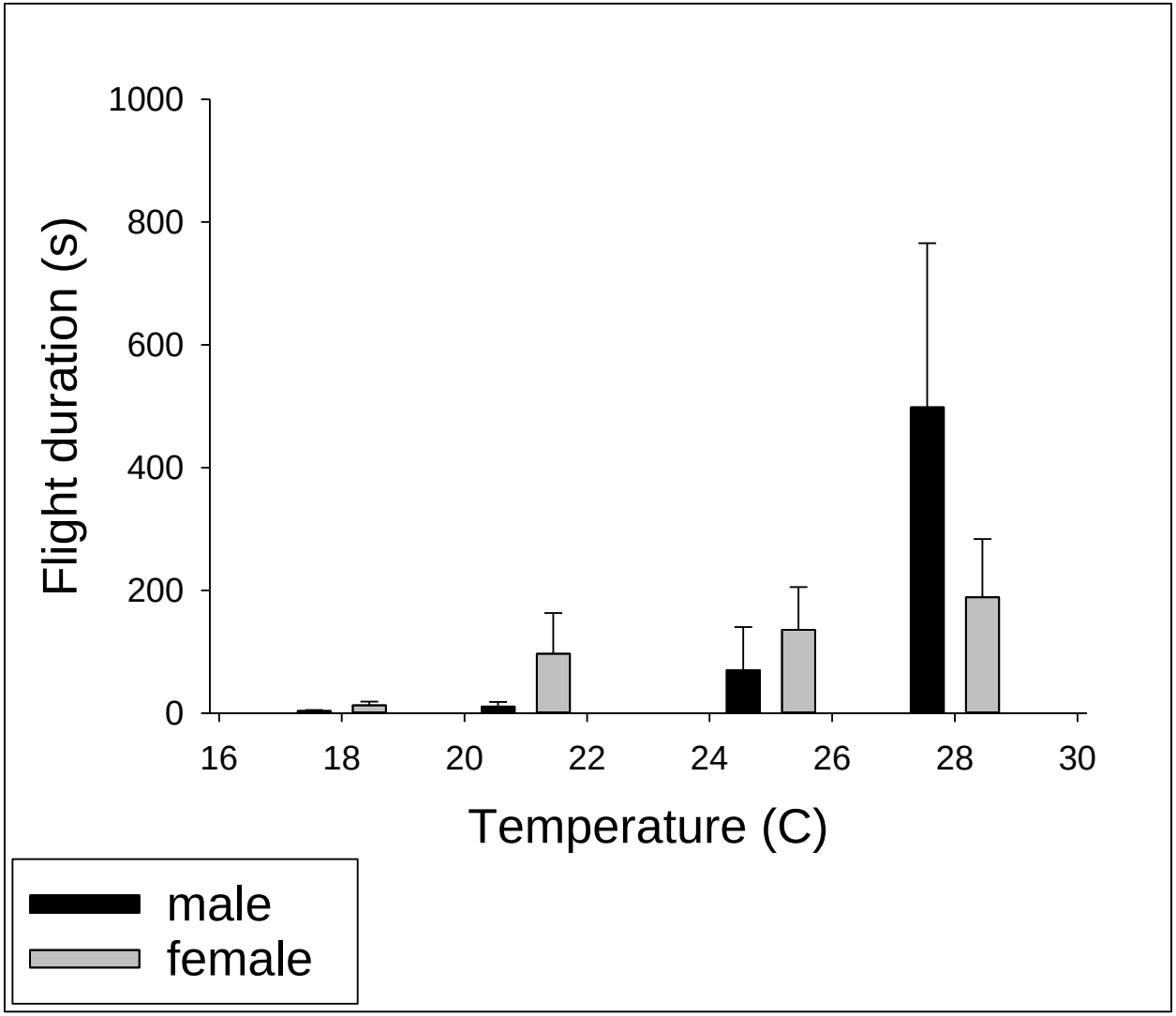
Flight mill apparatus





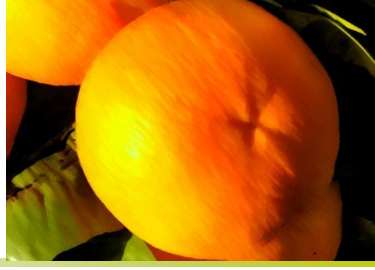
- Psyllids between 4 to 15 days old
- Allowed 10 min to fly
- Flight recorded until psyllid stopped to fly for > 5min

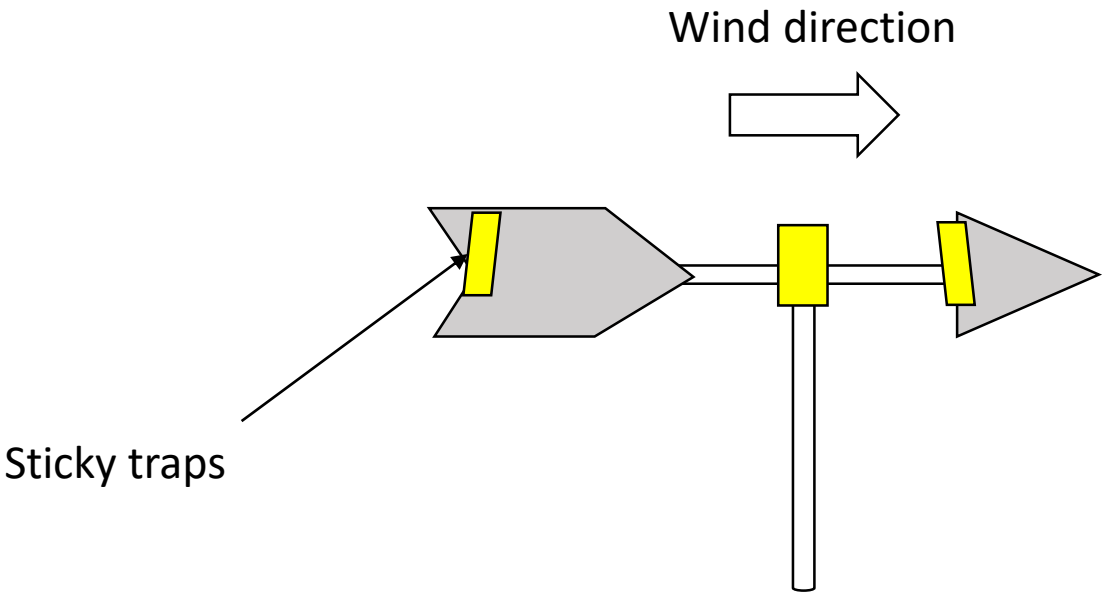
Temperature influence flight capability of *D. citri*



Dispersal capabilities of psyllids increase with temperature

Assessment of wind direction in the field





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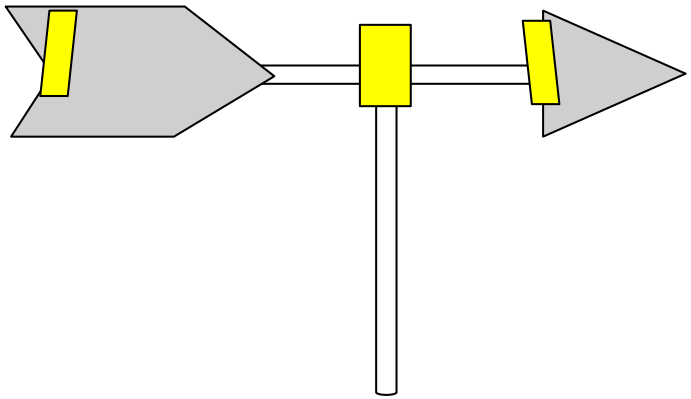
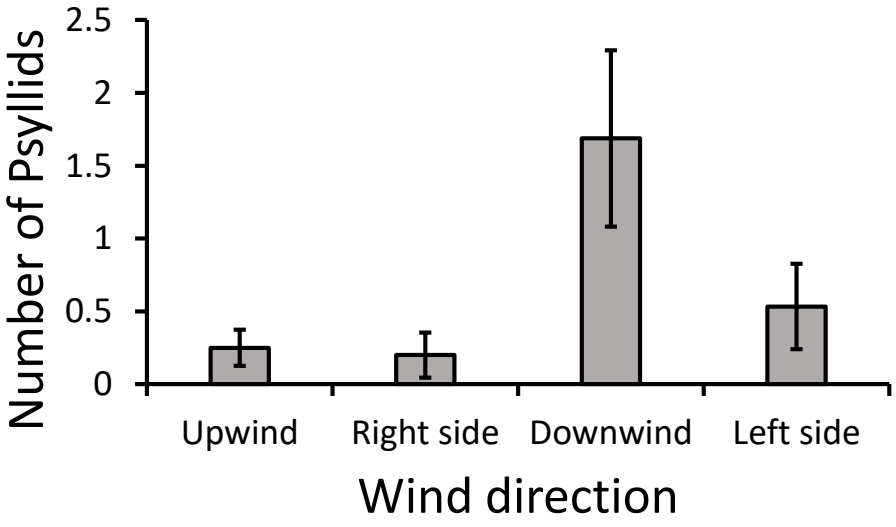




Asian citrus psyllid tend to move upwind

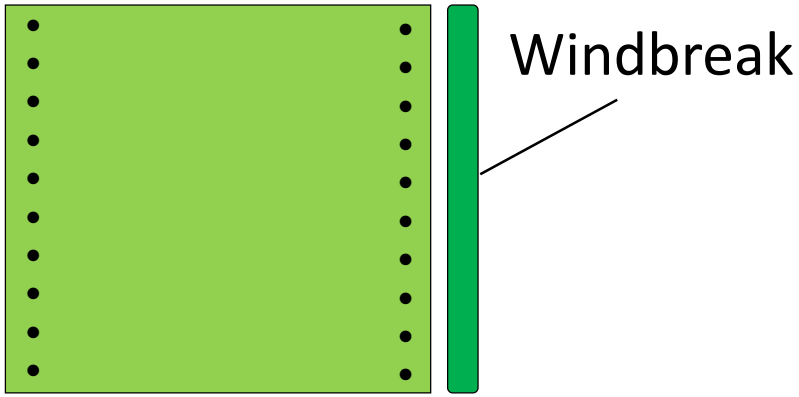
Presence of windbreaks

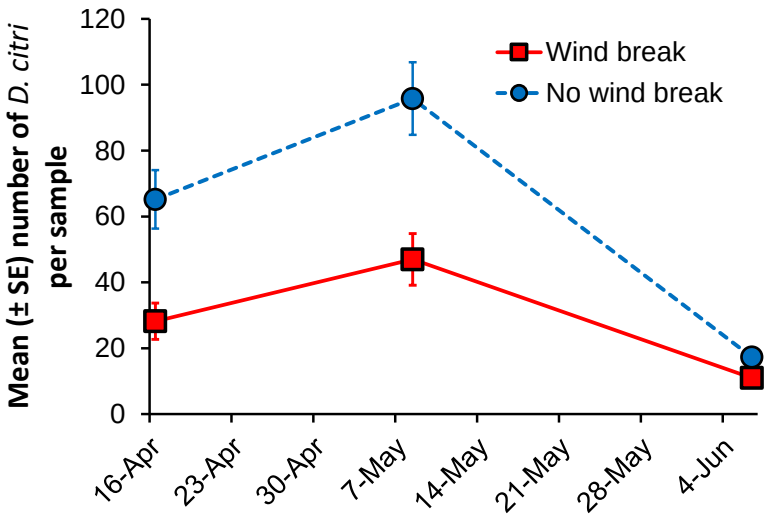
Windbreaks are erected to protect orchards from extreme weather to manage citrus canker

Effect on *D. citri* populations?

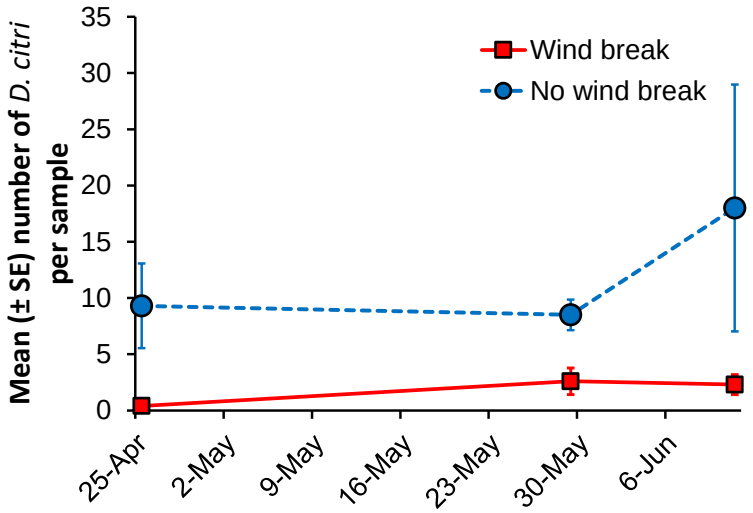
Presence of windbreak

5 Groves
2 months of sampling
Use a vacuum insect sampler



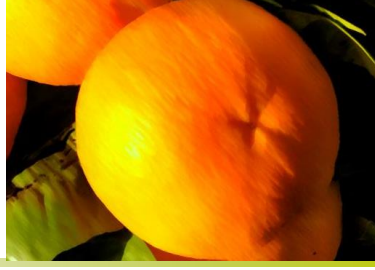


GLMM on pooled data:
$\chi = 1141.9$, $P < 0.001$



Martini X. et al. 2015. *Agriculture, Ecosystem, and the Environment*

Psyllid sampling methods



Flush examination: observing and counting during approximately 40 s psyllid adults found in tree canopy

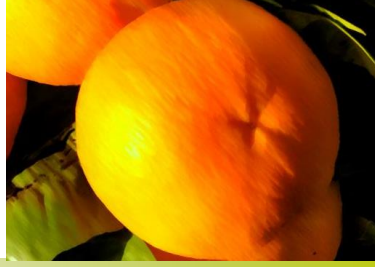
Sticky traps

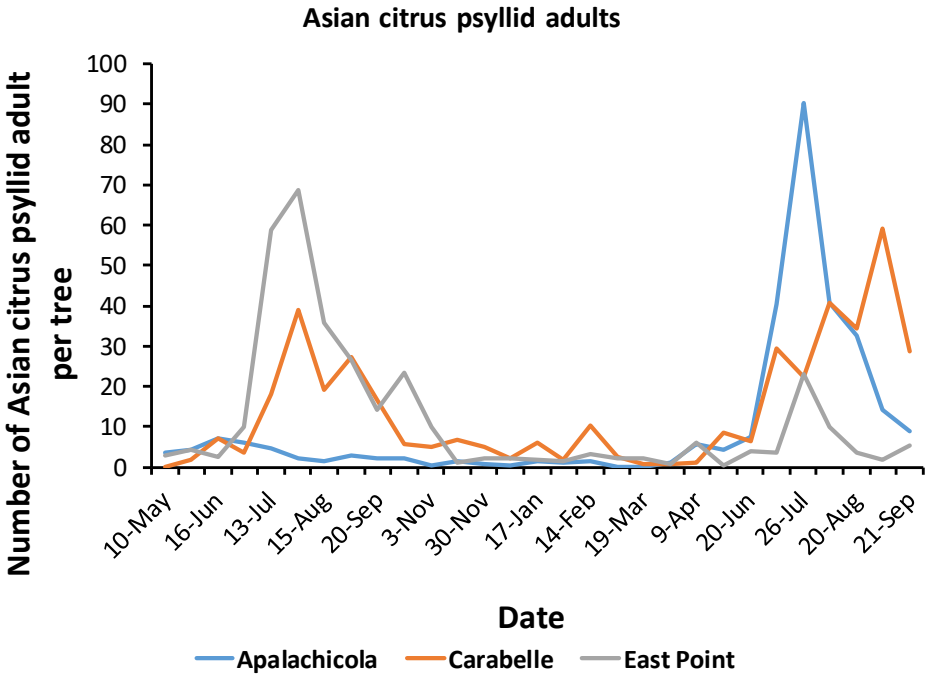
www.alphascents.com

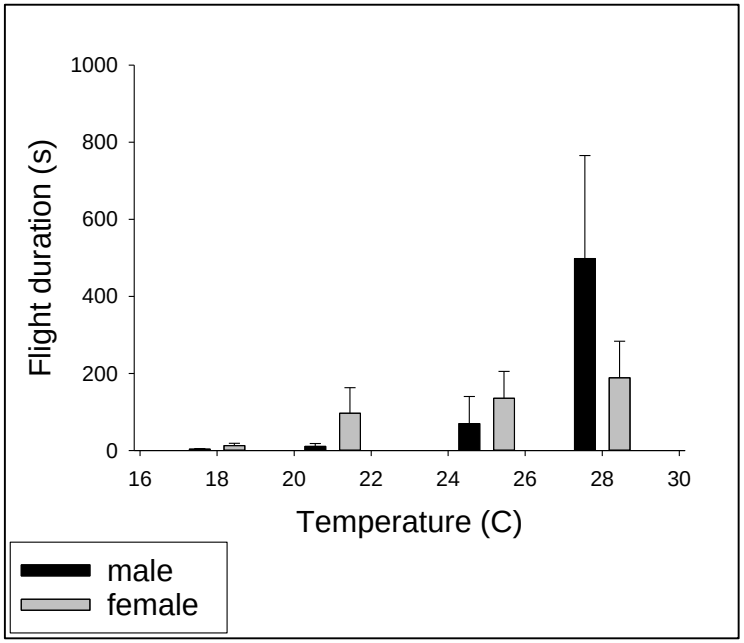
www.iscatech.com

Tapping: Tap a randomly selected branch three times with a stick (PVC pipe). Psyllid adults are counted as they fell on a clipboard above.

When to sample?

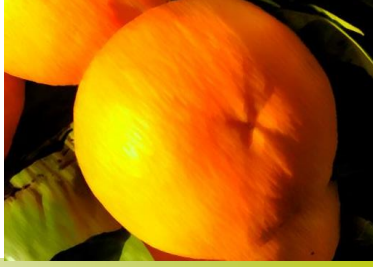






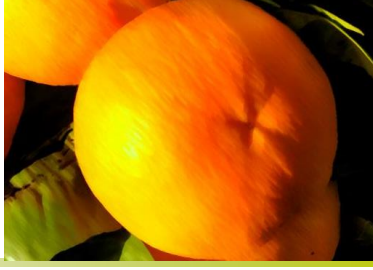
June from October is the period with the highest risk of psyllid infestation in North Florida and Georgia

Final thoughts



- Psyllids move—long distances
- ACP is intimately associated with the HLB pathogen
- ACP likely had been spreading disease for many years before HLB was first detected in Florida and before we began controlling it

Final thoughts



- Psyllids survived winter in North Florida. They are likely to stay in the area in the future.
- Psyllids have not been found in a any citrus grove in Florida panhandle so far, only in dooryard citrus
- The period with the highest risk of psyllid infestation for north Florida and Georgia is between June and October.
- If trees are treated in due time, chances that the disease will be transmitted are reduced.

Acknowledgments

Murphy Citrus Nursery