

Around the clock field videography of the Asian citrus psyllid in southern California: Natural enemy and ally interactions



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Asian citrus psyllid (ACP) *Diaphorina citri* (Hemiptera: Liviidae)



- Efficient vector of the bacterium responsible for the deadly and incurable citrus disease Huanglongbing (HLB)
- Feeds on most citrus varieties (Rutaceae)
- Thrives in both urban and agricultural areas
- Fast developmental time (egg to adult in 2-3 weeks)
- Adults act like flying contaminated syringes (good dispersers)

ACP-HLB complex threatens US \$14 billion citrus industry

- **FL Case Study:**

- ACP and HLB discovered in FL in 1998 and 2005, respectively
- Both are widespread throughout the state
- HLB infects all 32 citrus producing counties in FL
- Fruit production decreased by 49%
- Cost FL citrus industry \$3.63 billion in losses since 2005

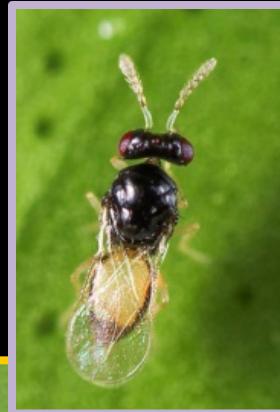


Photo by Tamara Lush

- **CA (the jury is still out):**

- ACP and HLB discovered in CA in 2008 and 2012, respectively
- ACP is widespread throughout SoCal
- 13 cases of HLB in LA County (thus far)
- Pesticides are employed in commercial groves
- **Biological control is utilized in urban citrus (36% of all homes have citrus)**

Do natural enemies control urban ACP?



- Yes, but their impact varies widely
- Dominant generalist predators include lady beetles, hover flies, lacewings, and spiders
- In Florida, lady beetles kill more ACP than *T. radiata*

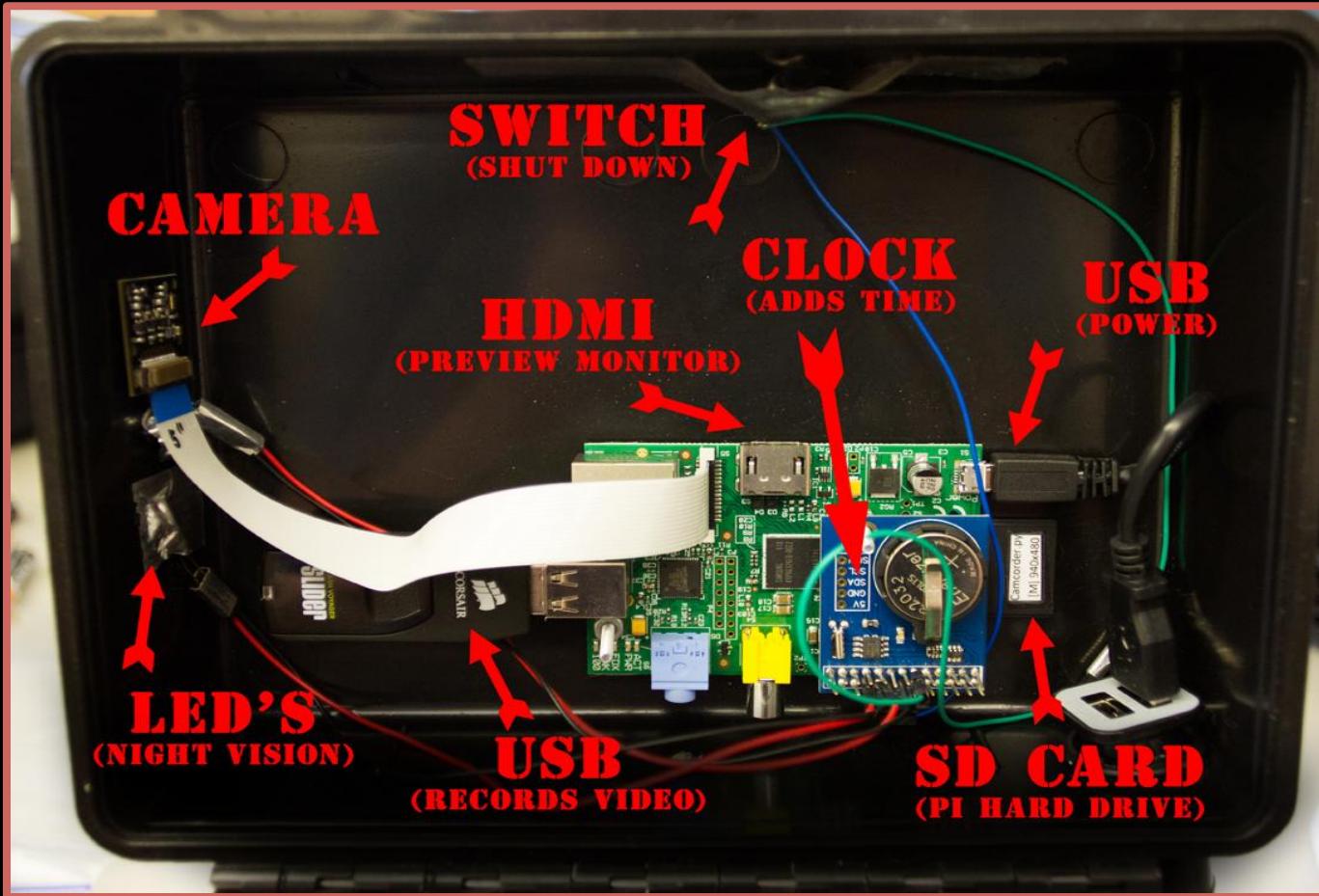
Filming ACP Cohorts in the Field

- Employing DVR to document predator activity on ACP colonies
- Camera adjusted for Macro, focuses at 5"
- Approximately 5 days of recordings (940x480 current res) (120 hours)



- Cameras housed in air tight protective case for outdoor use

Raspberry Pi Camera Specs



- 5MP Camera (2592x1944)
- Infrared capability with LED's for nighttime recordings
 - 128 gb storage capacity

Filming ACP at three sites repeated across summer, fall, winter, and spring months



UC-R Biocontrol Plot



Lochmoor (private property)



Jurupa (private property)

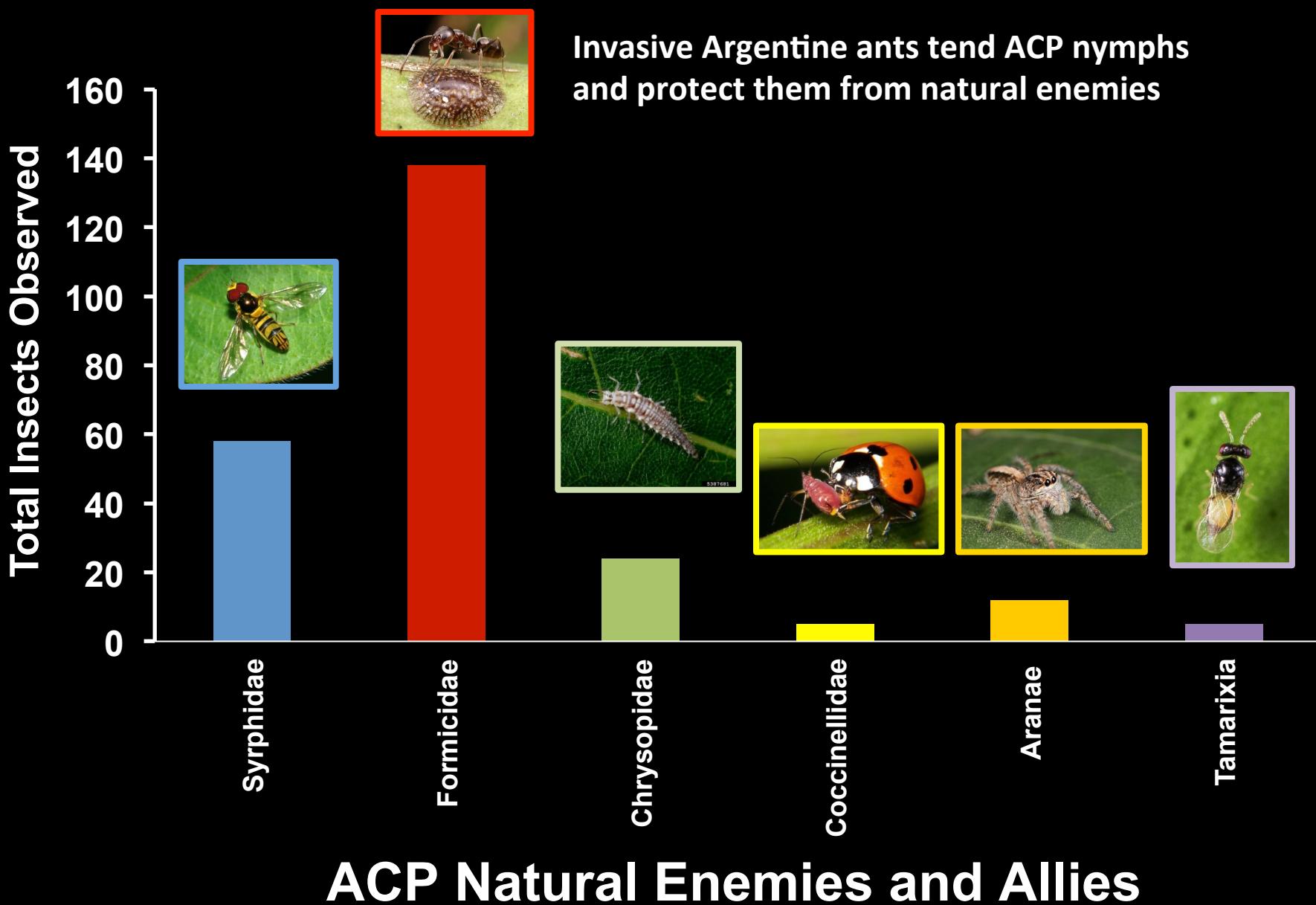
Theft proof for use in urban settings



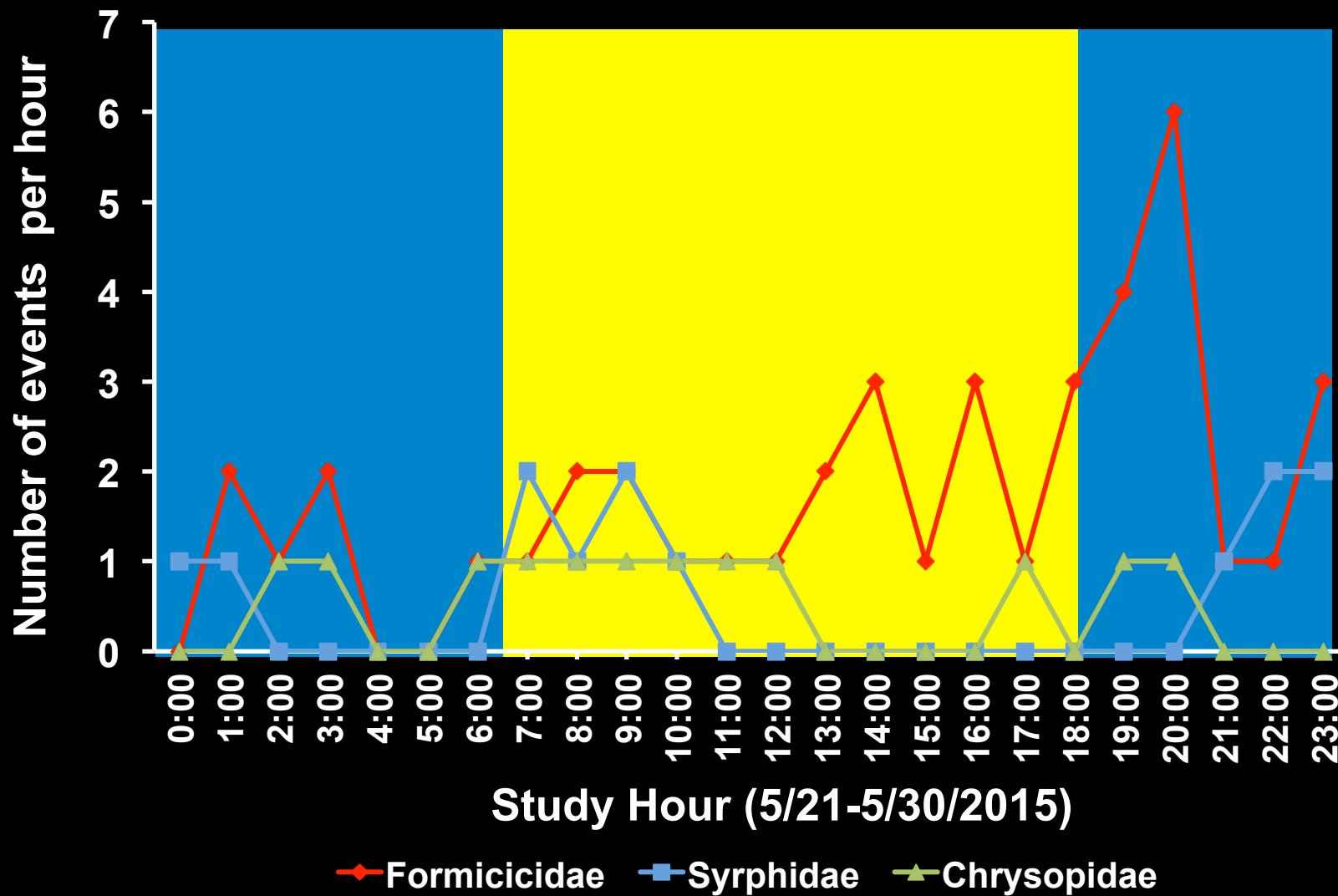




Common Insects on ACP Cohorts (Spring – Fall 2015)



Number of insects visiting ACP cohort daily



◆ Formicicidae ■ Syrphidae ▲ Chrysopidae

- Insect activity/hr varied significantly ($P < 0.01$)
- Insect interactions with ACP varied by insect family ($P < 0.05$)



Findings To Date

- Dominant predators: lacewing and hover fly larvae
 - ~70% of all observed predation events
 - Active during both day and night
 - Observed year round at all field sites
- Mites, spiders and thrips are often seen eating eggs and small instars
- Night time predation accounts for 50-60% of all predation events
- Argentine ants are commonly observed tending/protecting ACP nymphs (Biocontrol Impediment)

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