

The *Tamarixia* Release Program and Biological Control of the Asian Citrus Psyllid



Robin J. Stuart and Christopher Kerr
Florida Department of Agriculture and Consumer Services
Division of Plant Industry
Gainesville and Dundee, Florida USA



The Asian Citrus Psyllid, *Diaphorina citri* -- Vector of Citrus Greening Disease (Huanglongbing)



- Lays eggs on new flush
- Nymphs develop through 5 instars
- Adults and nymphs are phloem feeders
- Nymphs produce white waxy secretion

Natural Enemies of Asian Citrus Psyllid

Predators

- Lady beetles
- Lacewings
- Ants
- Spiders



Pathogens

- Fungus *Hirsutella* sp.
- Fungus *Isaria fumosorosea* Wize (Ifr)

Parasitoid Wasps

- *Tamarixia radiata*
- *Diaphorencyrtus aligarhensis*



Tamarixia radiata – Parasitoid Wasp From Asia



- Highly host specific to ACP
- Kills psyllid nymphs by host-feeding and parasitism
- One female wasp can kill >500 psyllid nymphs in 30 days

Tamarixia radiata -- Most Effective Parasitoid Known Against the Asian Citrus Psyllid

- Long history of effective use and research in many countries
- First released in Florida in 1999
- Establishes, reproduces and overwinters in Florida citrus groves
- Parasitism rates highly variable but can reach >80% in late summer



Tamarixia Release Program

- Florida Dept. of Agriculture and Consumer Services (FDACS)
 - Division of Plant Industry (DPI)
 - Bureau of Methods Development and Biological Control (Methods)
- Initially: Classical Biocontrol Program
 - Introduce and establish the species
- Now: Augmentative Biocontrol Program
 - Supplement or re-establish populations where needed
- DPI produces over 3 million *Tamarixia* per year



Tamarixia Releases Target Sites of Maximum Potential Impact

Sites without intensive pesticide programs:

- Organic groves
- Abandoned groves (if still flushing)
- Conventional groves on reduced (or ineffective) spray programs
- Residential areas with dooryard citrus and alternate hosts, which include certain ornamentals and common hedge plants:
 - Orange jasmine, *Murraya paniculata*
 - Chinese box orange, *Severinia buxifolia*

Gainesville Laboratory

- Produces over 1 million
Tamarixia per year



Dundee Laboratory

- Produces over 2 million *Tamarixia* per year
- Officially opened Feb. 7, 2014
- Continuing lab expansion to increase rearing capacity to 4-6 million per year



Rearing Tamarixia - Greenhouse



- Begin with 9000 orange jasmine plants (*Murraya paniculata*)
- Daily pruning of plant cohorts to induce the growth of new flush
- Wait 2 weeks then transfer best plants to insect rearing cages

Rearing Tamarixia – Psyllid House



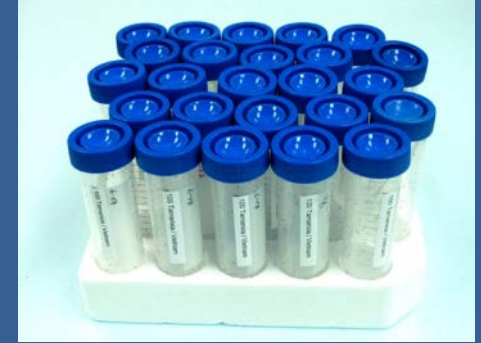
- Place 15 plants/cage, add 3000 adult ACP, wait 3 days for egg laying
- Transfer plants to development cages, wait 6-7 days for nymphs

Rearing Tamarixia – Growth Chambers



- Transfer plants to parasitism cages, add 300-600 Tamarixia adults
- Wait 11-12 days and begin harvesting next generation of Tamarixia

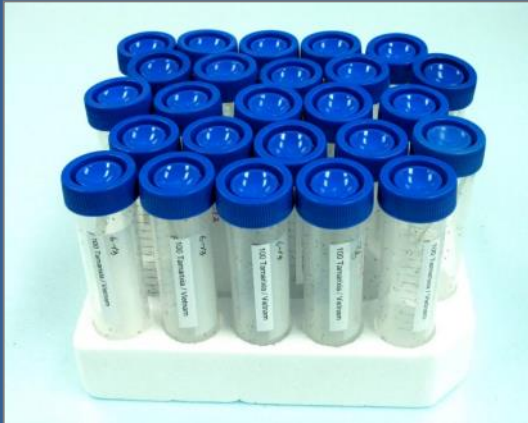
Rearing Tamarixia – Sorting Hood



- Harvested mixture of insects released onto light panel
- Tamarixia aspirated into 50 ml vials, 200/vial
- Psyllids collected and returned to Psyllid House

Tamarixia Releases

- Releases by DPI staff, growers and home owners
- Free upon request
- Picked up at Dundee lab or shipped overnight
- Tamarixia tapped onto foliage (prefer flush with ACP nymphs) or open vials can be placed in or under the citrus canopy

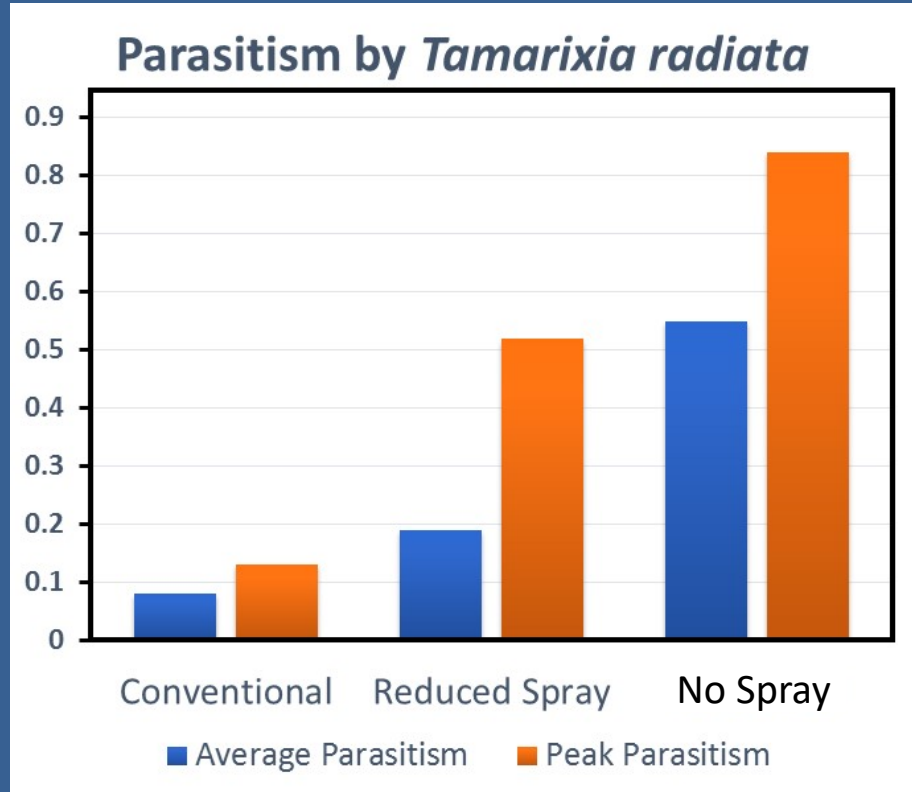


Tamarixia Program Constraints

- *Tamarixia* production is limited. Wasps used strategically to assist as many growers/home owners/areas as possible.
- Goal is to inoculate an area; establish or augment populations; cannot blanket an area with overwhelming numbers of wasps.
- Limited resources and personnel; need grower and home owner cooperators to locate suitable release sites and conduct releases.

Effectiveness of *Tamarixia* Releases

- Effectiveness of *Tamarixia* releases depends on the type of site.
- Most effective in sites with no pesticide program (“No Spray”) (unpublished)



Dooryard Tamarixia Release Program

- Many homeowners have citrus or certain ornamentals that harbor ACP and greening disease.
- Homeowners often irrigate and fertilize, which leads to frequent flushing and ideal habitat for ACP.
- Dooryard plantings can serve as a reservoir for ACP and disease that can move into commercial groves.
- Homeowners may not know about ACP or how to control it but are generally very interested in biological control and helping to protect Florida's citrus groves!

Public Participation in Tamarixia Releases

- Homeowners (<70 trees) can request Tamarixia on line: Tamarixia Release Application <https://www.freshfromflorida.com>
- 2,045 requests received in first 7 months
- Includes:
 - 14,380 residential trees (average 7/participant)
 - 5,090 residential acres (average 2.5/participant)
 - 233 participants reporting *Murraya* sp. plantings
- 72% of sites have received releases to date; remainder to receive releases soon



Collaboration with UF/IFAS Extension

- **UF/IFAS Extension assists with Tamarixia distribution in the dooryard release program:**
 - Introduces residents to local extension agencies and their services
 - Greater outreach and education to participants on citrus, ACP, HLB, and biological control
 - Significant savings on shipping costs and labor
- **33 County Extension Agents and Master Gardeners have participated to date and assisted with over 75% of dooryard releases!**

To Participate in the Tamarixia Release Program

Homeowners (< 70 trees): visit FreshFromFlorida.com
("Tamarixia Release Application")

Growers (> 70 trees) contact:

Dr. Robin J. Stuart
Dundee Biological Control
Laboratory

8020 Lake Mabel Loop Road
Dundee, FL 33838

Phone: (863) 438-9222

robin.stuart@freshfromflorida.com



Thank You!!! Questions?



