Everglades Cooperative Invasive Species Management Area

Biological Control of Weeds

Operational & Research Report 2025

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BRAZILIAN PEPPERTREE

Schinus terebinthifolia (Anacardiaceae)

Lead Scientist: Dale Halbritter, Ph.D.

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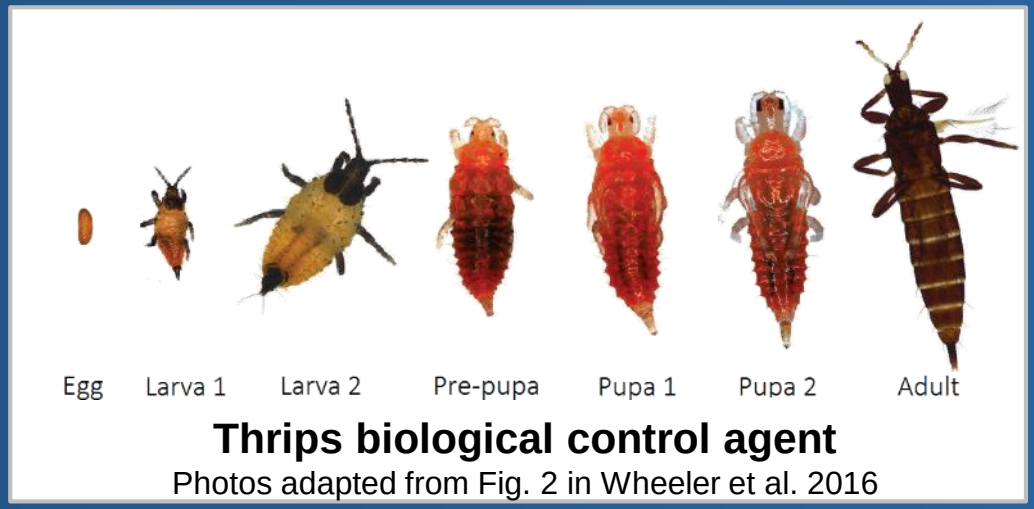
BRAZILIAN PEPPERTREE

Schinus terebinthifolia (Anacardiaceae)

- Highly invasive woody shrub or small tree in both natural and urbanized areas: over 700,000 acres in FL

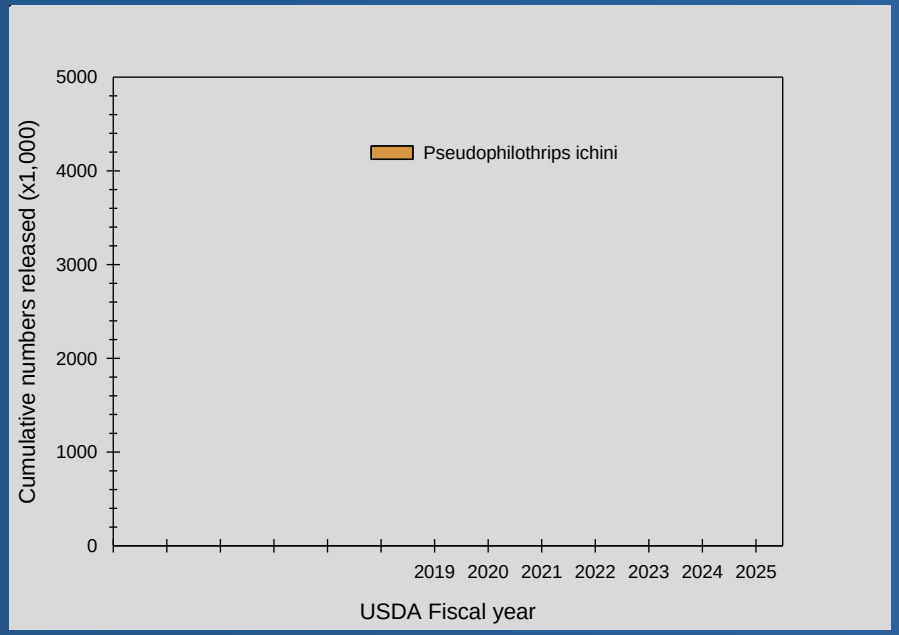
- ***Pseudophilothrips ichini*** (Thysanoptera: Phlaeothripidae) attacks flushing stems and leaves. Mass rearing and release continues



Thrips biological control agent

Photos adapted from Fig. 2 in Wheeler et al. 2016

July 2025 to March 2025 – CERP footprint only	
Number of release points	Number of thrips released
42	100,150

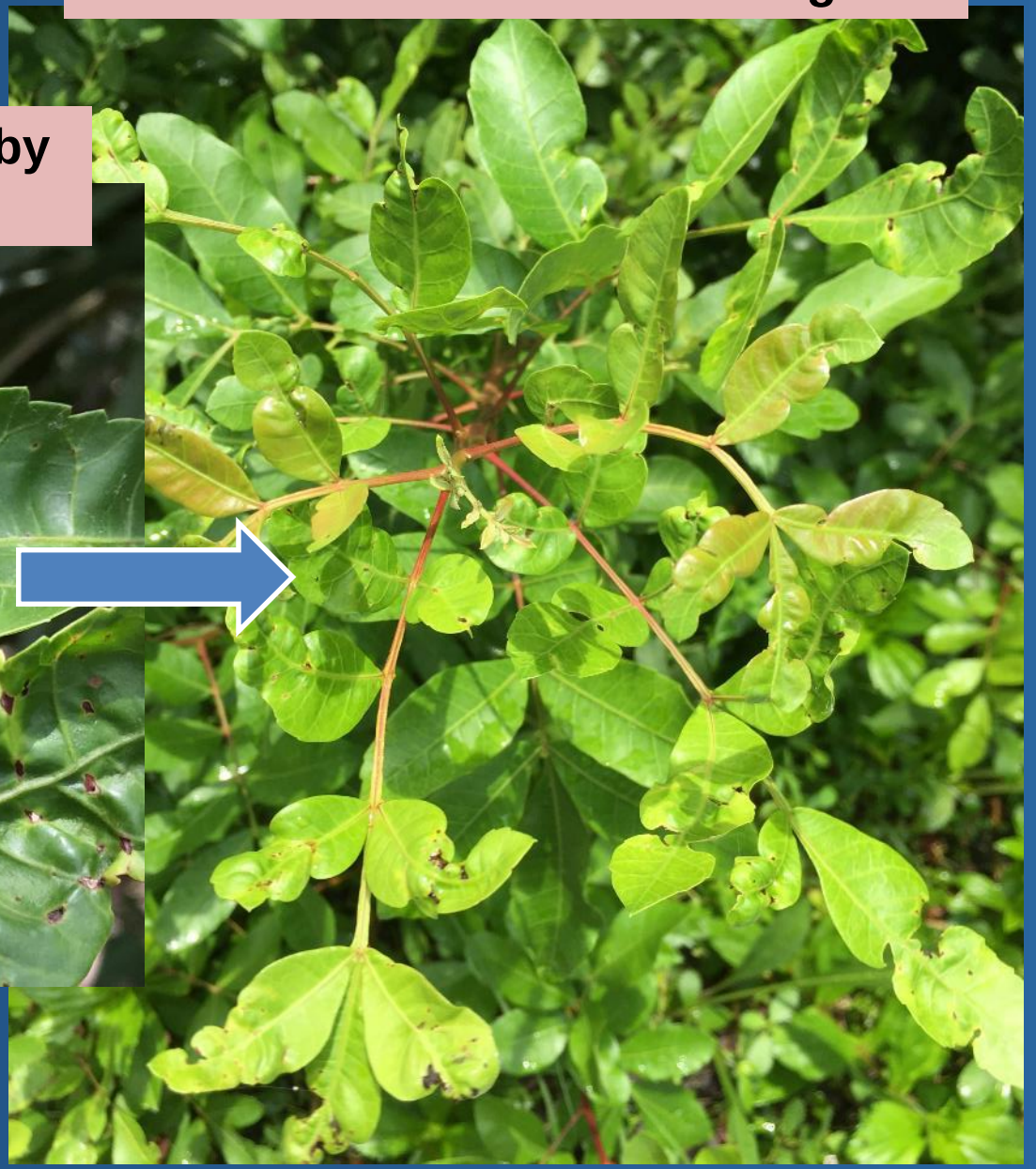


Thrips damage: leaves

Fresh leaf damage

Mature leaf deformed by earlier damage

Accumulation of leaf damage



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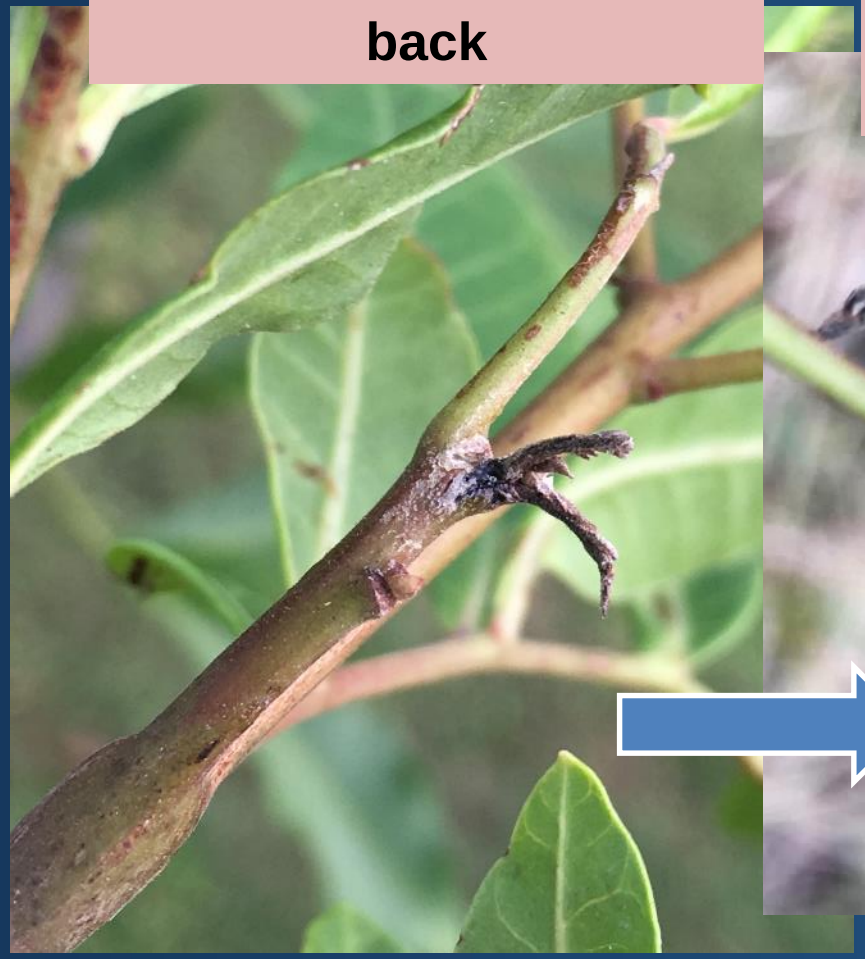
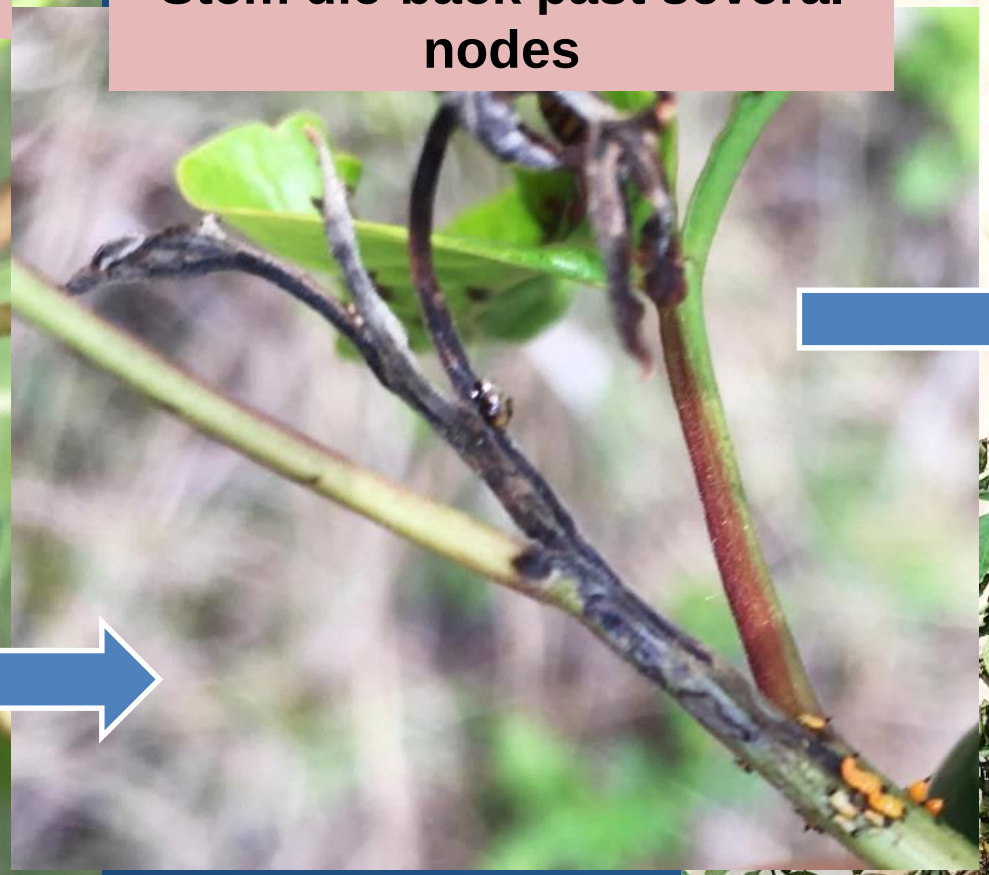
Thrips damage: stems

Terminal meristem die-back



Stem die-back past several nodes



Flagging and major stem die-back

Low thrips densities → **High thrips densities**

Thrips damage can lead to changes in plant architecture (Halbritter et al. 2023)

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Updates on thrips establishment

- >60% of sites now have thrips documented
- 41 sites have thrips after 1 year + since last release
- One site still has thrips ~1,800 days after the last release

All releases made by IPRL, UF, and FDACS since 2019

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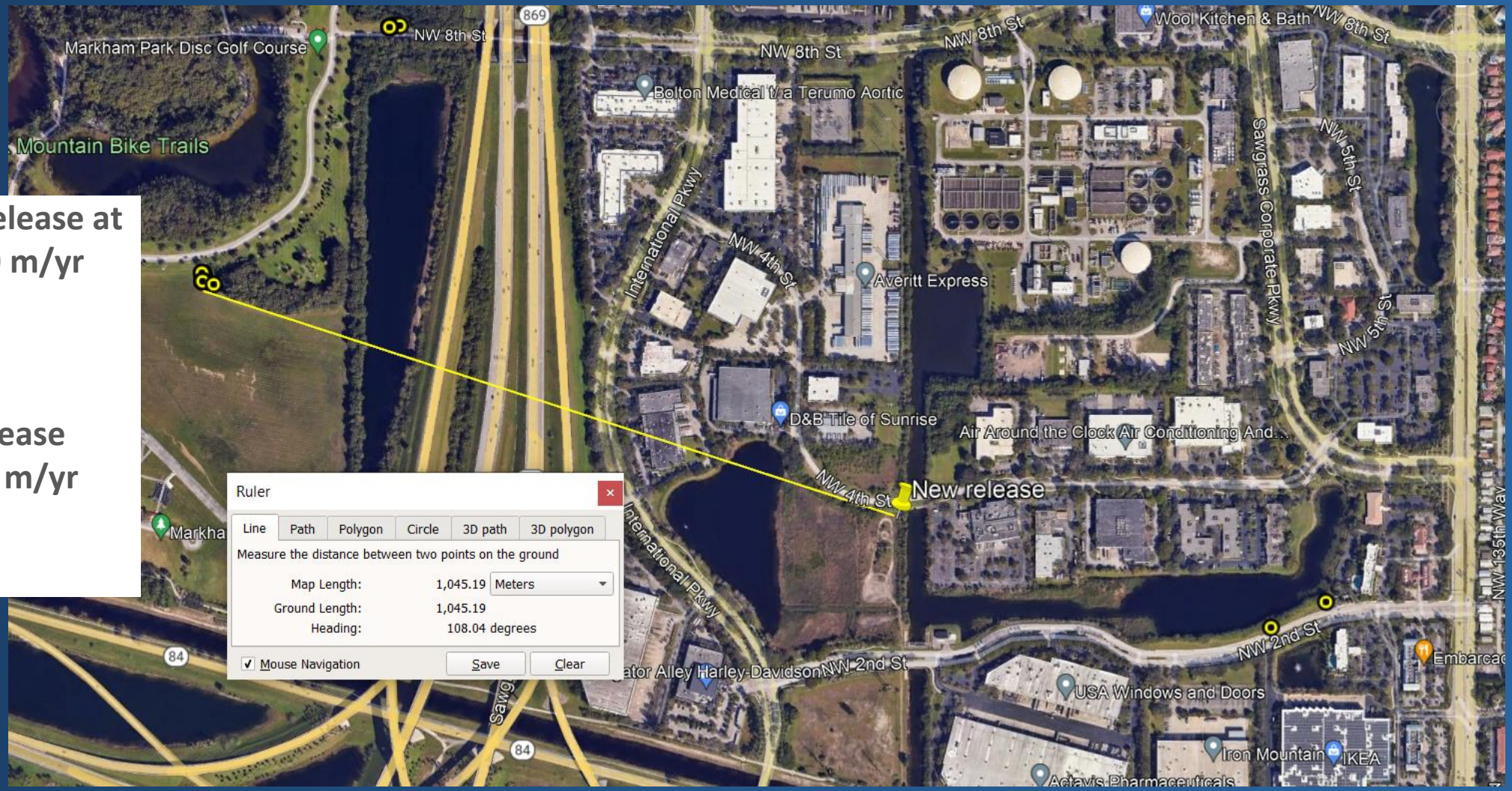
Release statistics: Dispersal

- Based on first release at Markham-> 240 m/yr

OR

- More recent release nearby -> 1,277 m/yr



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Long-term impacts in Environmentally Endangered Lands (Miami-Dade Co) and SFWMD sites

- Measure changes in plant understory communities
- Capture litterfall, including fallen thrips damage
- Collect canopy demographics
- 3 site replicates

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AIR POTATO *Dioscorea bulbifera* (Dioscoreaceae)

Lead Scientist: F. Allen Dray Jr., Ph.D.

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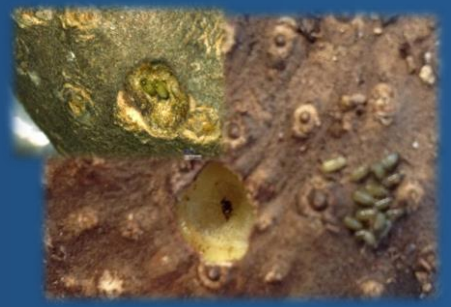
Lilioceris egena releases have started

The two *Lilioceris* species, *L. cheni* and *L. egena*, have biologies that complement each other in ways that should amplify the stress on air potato populations

	1. Primary adult feeding site	2. Primary oviposition site	3. Primary larval development site
L. cheni (leaves)			
L. egena (bulbils)			

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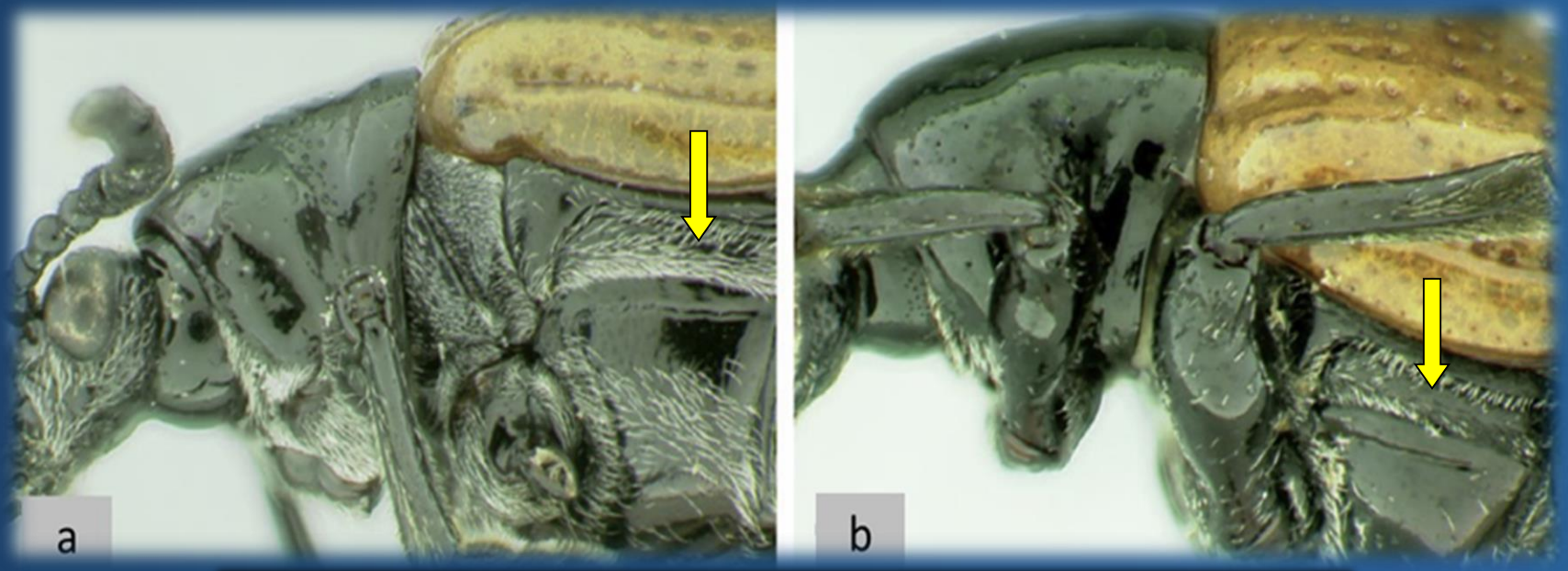
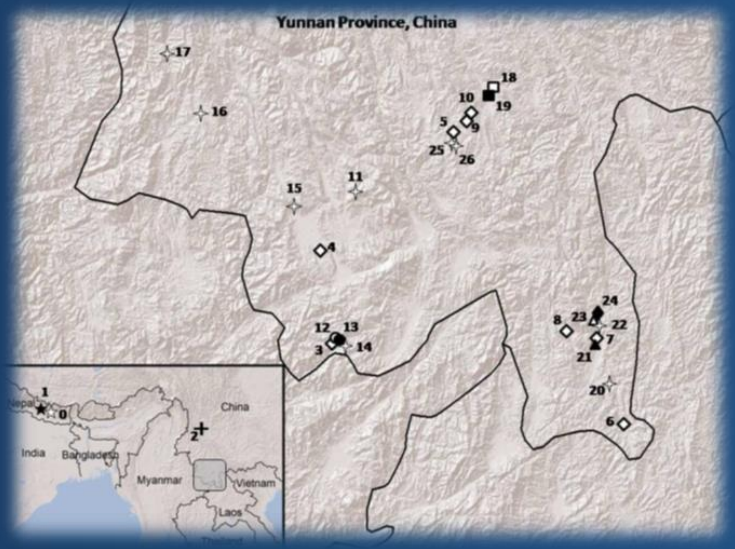


(1) *Lilioceris cheni* (a) and *Lilioceris egena* (b)

Credits:
(1) Tishechkin et al. (2011) *ZooKeys* 103: 68-83.

Quarantine Colonization and Host Range Testing Timelines

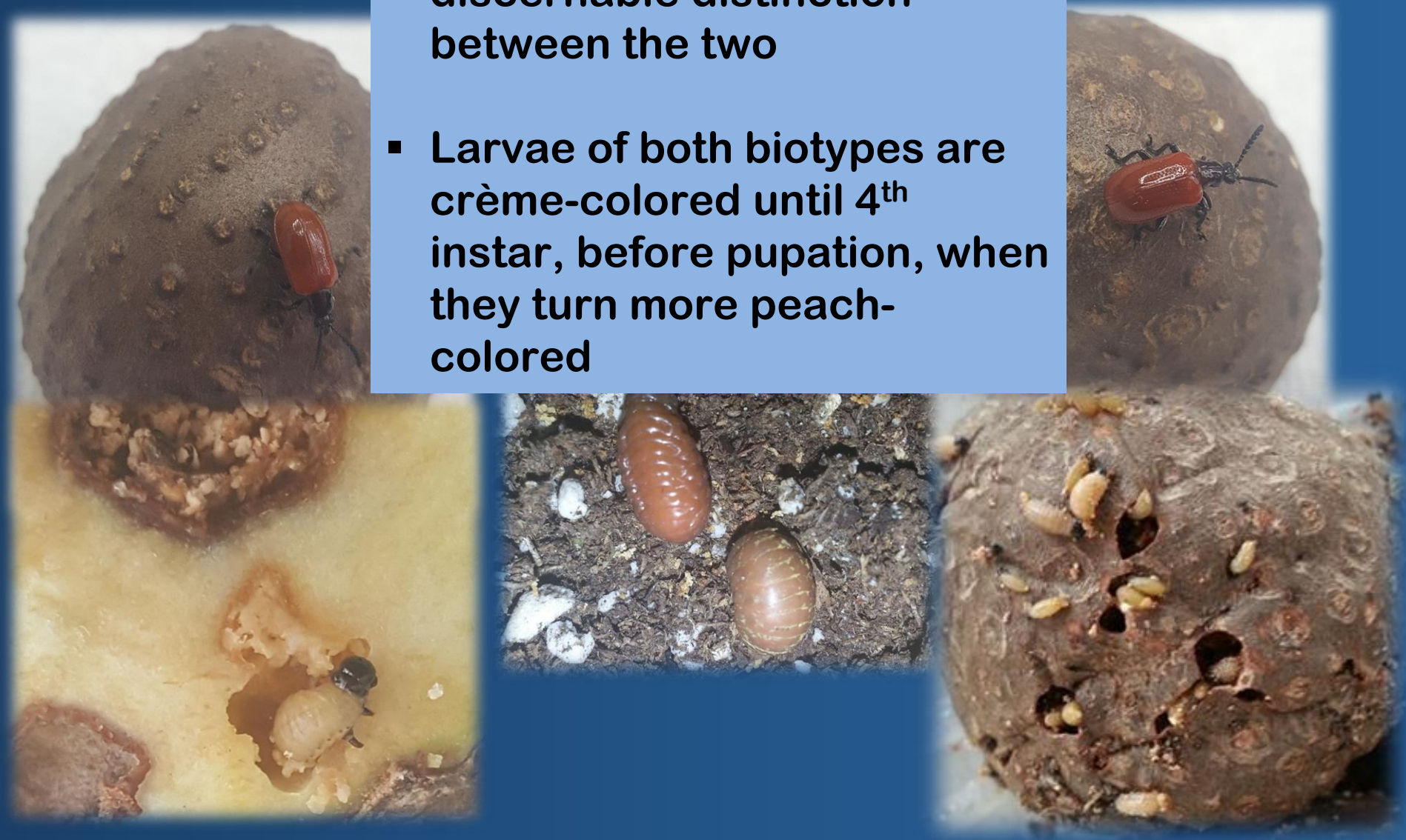


- Imported from China and colonized May 2011
- 82 species tested, of which 33 had storage organs
- 14 species from Dioscoreaceae + 1 other Dioscoreales
- 25 species related to hosts of other *Lilioceris* species
- 23 economic species

- APHIS approved release Mar 2021

- Adults of both biotypes are reddish in color, with no discernable distinction between the two

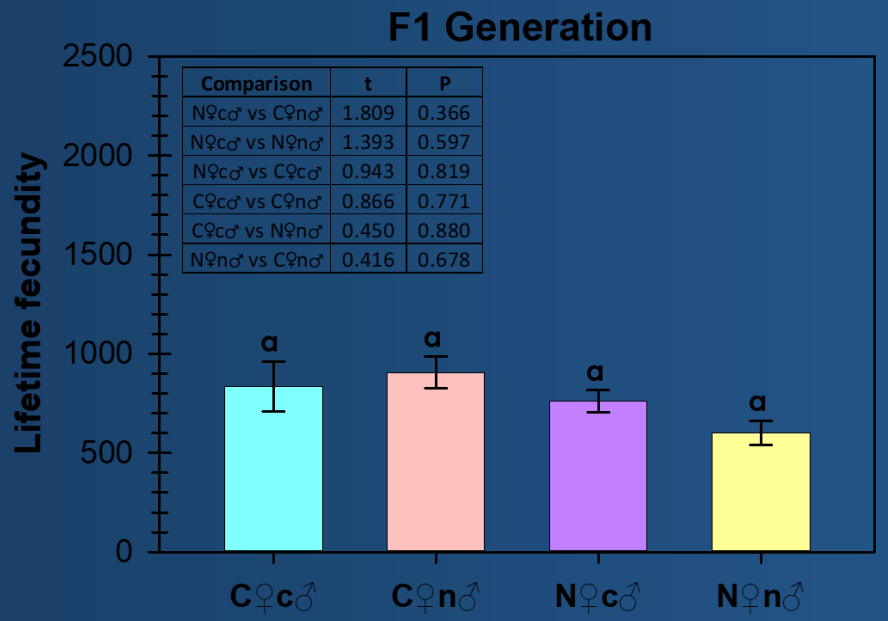
- Larvae of both biotypes are crème-colored until 4th instar, before pupation, when they turn more peach-colored

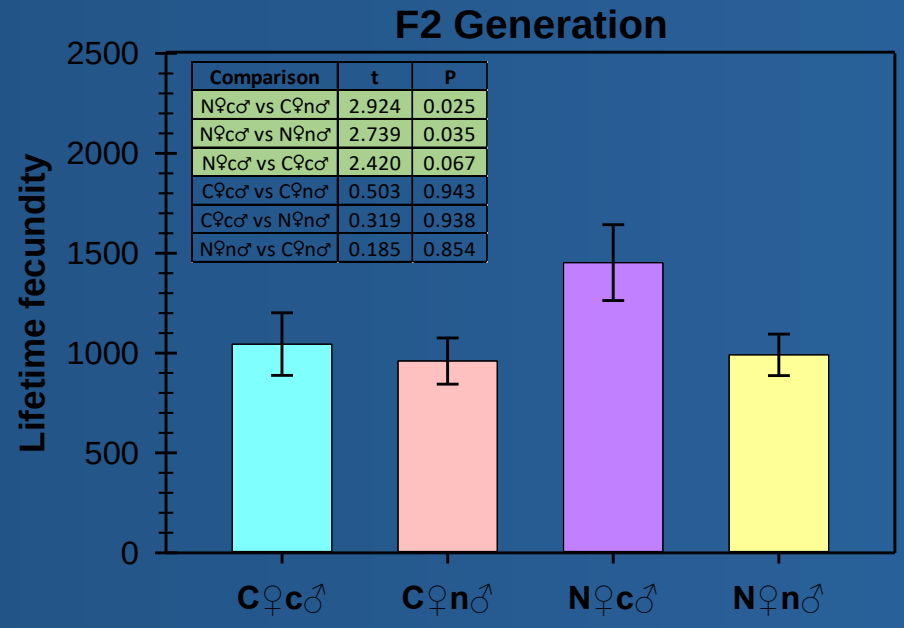


- No differences among lineages in F1 generation
- Nepalese ♀ x Chinese ♂ hybrids were more fecund than other lineages in F2 generation

- Nepalese ♀ F2 fecundity > F1 overall

F2 vs F1	t	P
C♀c♂	1.241	0.217
C♀n♂	0.321	0.748
N♀c♂	4.111	<0.001
N♀n♂	2.315	0.022





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Getting the Bugs Out: air potato bulbil beetle (*Lilioceris egena*) releases in Florida

Aug 2021 – May 2025
175,915 beetles released
1285 release events
30 FL counties

Counties
Alachua
Bay
Brevard
Broward
Charlotte
Citrus
Clay
Collier
Escambia
Glades
Hernando
Highlands
Hillsborough
Indian River
Lake
Lee
Leon
Manatee
Marion
Martin
Miami-Dade
Okeechobee
Orange
Palm Beach
Pinellas
Putnam
Sarasota
Seminole
St. Lucie
Sumter

USDA

Florida Department of Agriculture and Consumer Services
Commissioner Wilton Simpson

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Lilioceris egena preliminary release results

Matheson Hammock, Miami-Dade County
field releases Jan-Sep 2022

Decomposing medulla of
air potato bulbil, result of
large larval feeding load

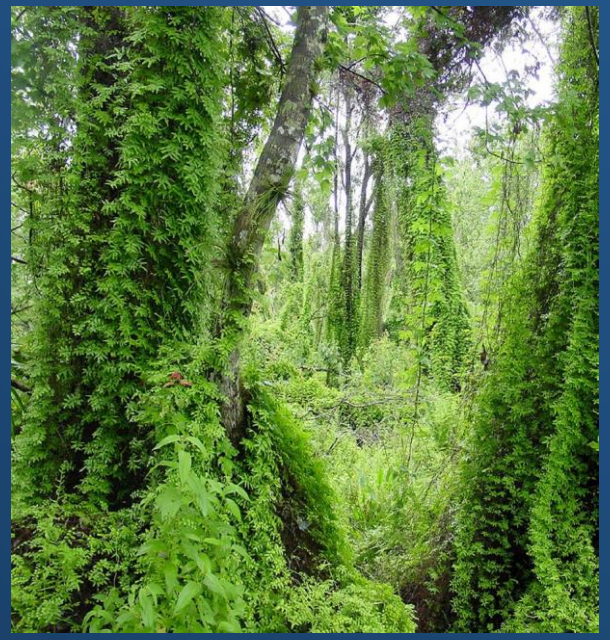
Cage study, IPRL campus, Aug-Nov 2021

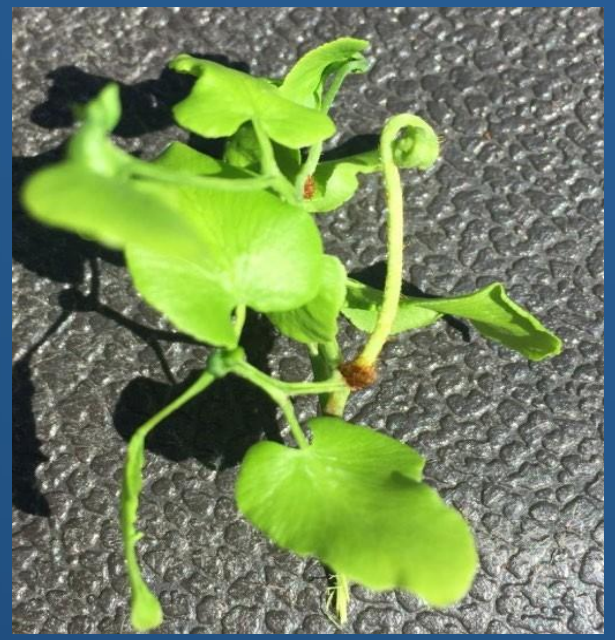
Frass indicating larval
feeding in bulbil on vine

OLD WORLD CLIMBING FERN

Lygodium microphyllum (Lygodiaceae)

Lead scientists: F. Allen Dray Jr., Ph.D.
Melissa Smith, Ph.D.
Gregory S. Wheeler, Ph.D.





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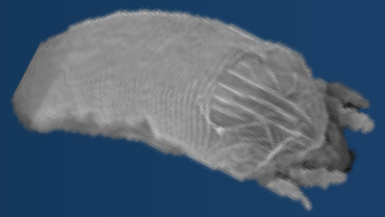
Lygodium: Biological Control Agents

Floracarus perrepae (Prostagmata: Eriophyidae)



Neomusotima conspurcatalis

(Lepidoptera: Crambidae)

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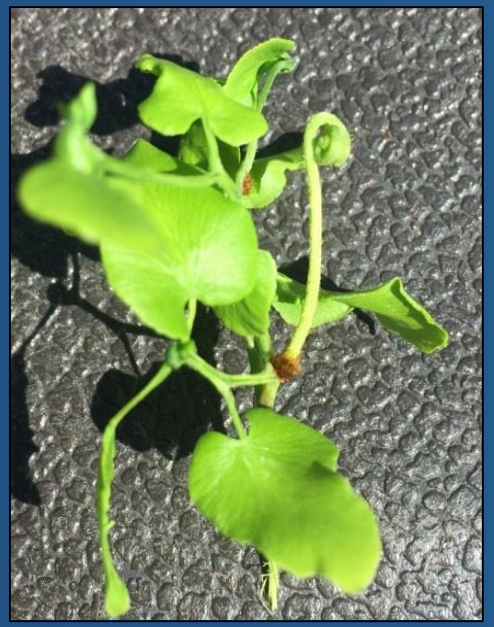
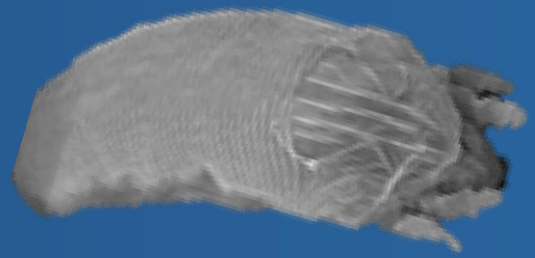
Releases of Lygodium Agents

Lygodium mite, *Floracarus perrepae*





Above ground biomass reduced by up to 49%

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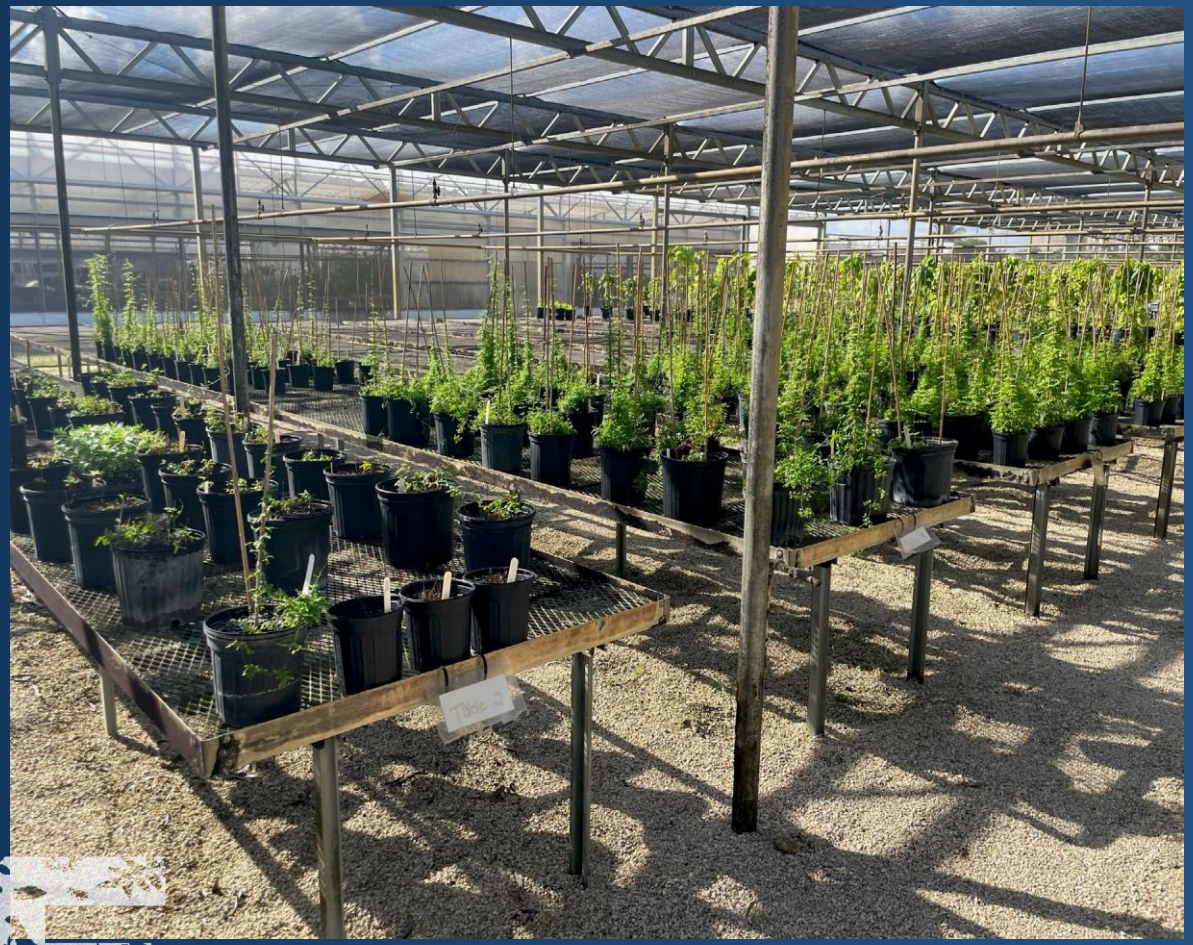
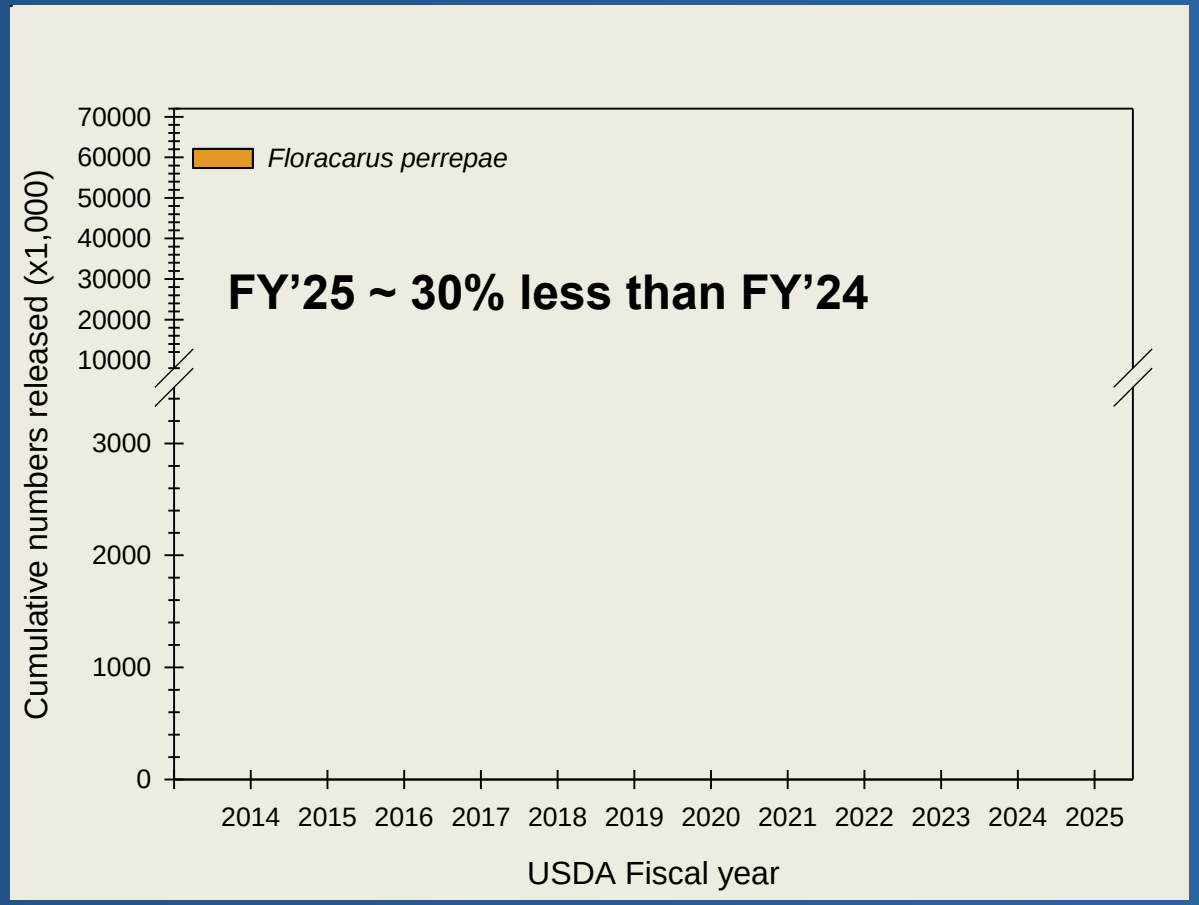
Releases of Lygodium Agents

Lygodium mite, *Floracarus perrepae*





281.7% increase in the estimated mites per plant

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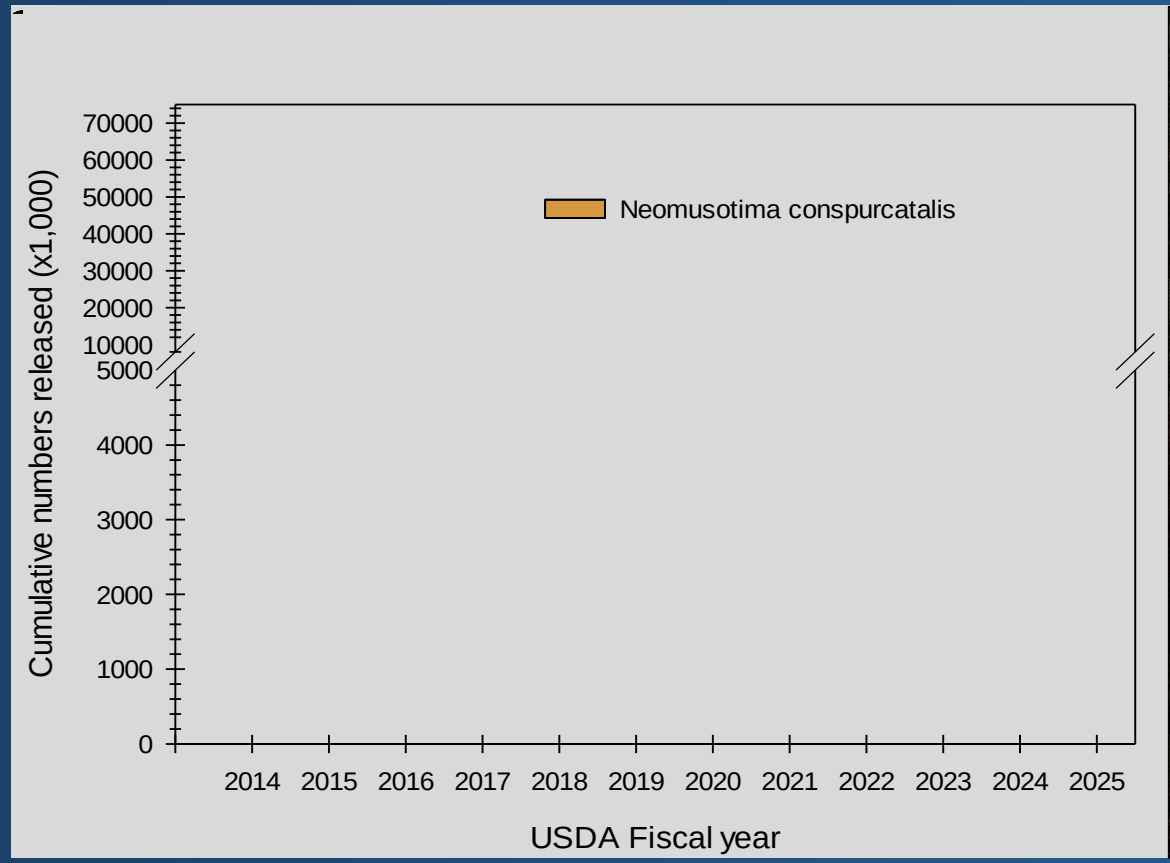
Releases of Lygodium Agents

Brown Lygodium Moth, *Neomusotima conspurcatalis*



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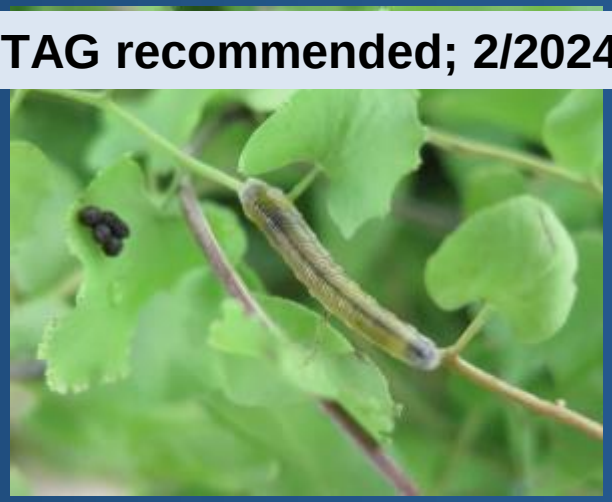
Potential biological control agents in quarantine IPRL

Lygomusotima stria

TAG recommended; 2025

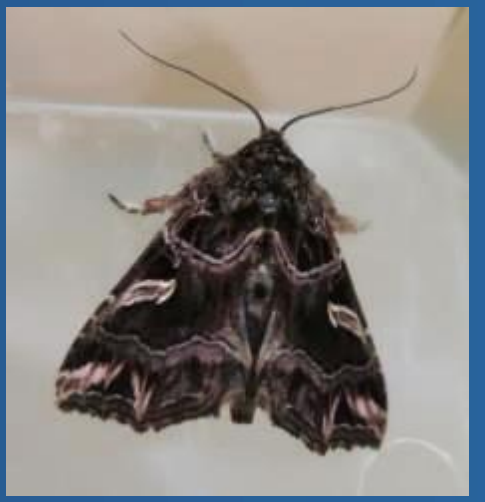
Neostromboceros albicomus

TAG recommended; 2/2024



Callopistria exotica

TAG recommended; 10/2023



COGONGRASS *Imperata cylindrica* (Poaceae)

Lead scientist: Gregory S. Wheeler, Ph.D.

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Cogongrass surveys in Africa - Center for Biological Control, Rhodes University, South Africa

Started June 2022

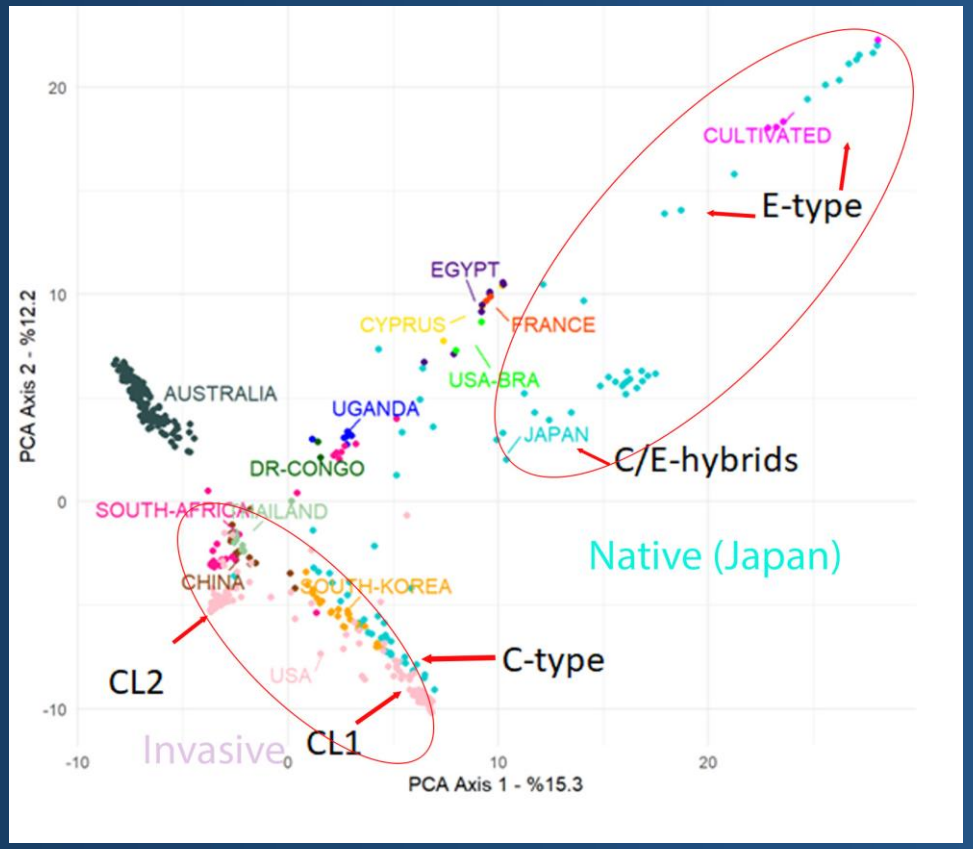
- Old world sub- and tropics distribution
- RADseq DNA analysis being used to determine origin of invasive types in US

Surveys focusing on South Africa (2023) and east Africa (2024) (red circles)

- Target insects include stem borers (*Acrapex* spp.)

Cogongrass surveys in Japan & South Korea

- Current surveys are focusing on Asia
- Target insects include stem gallers and stem & shoot borers



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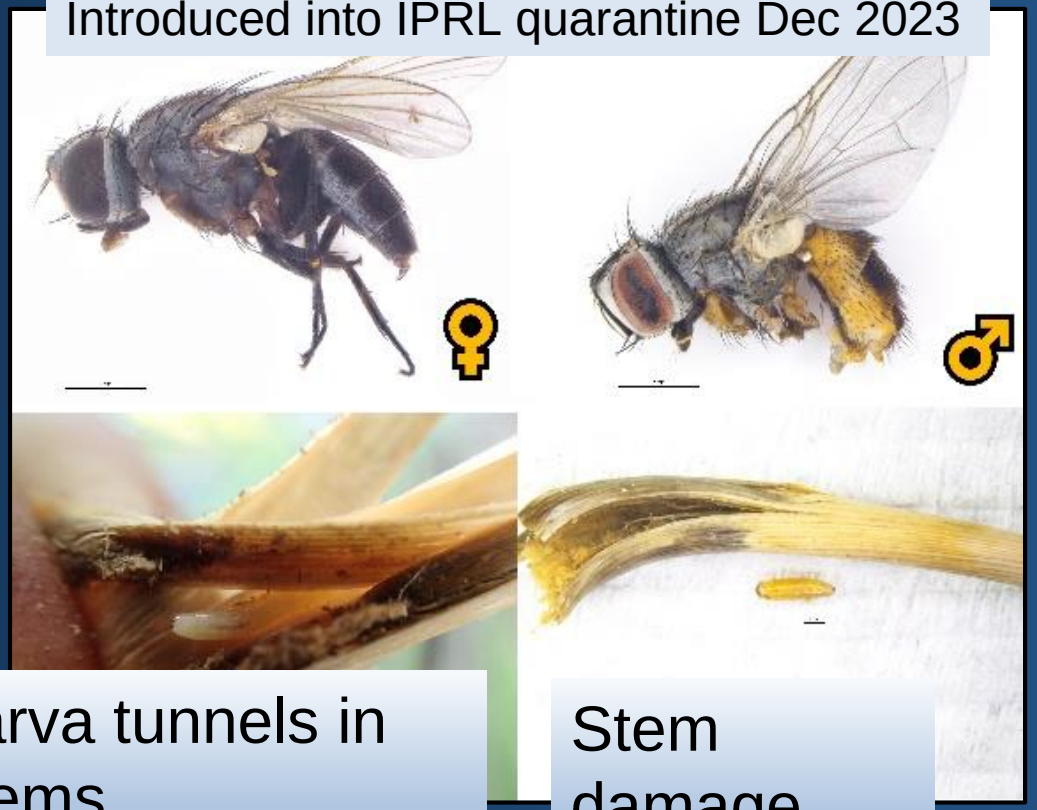
Cogongrass surveys in Australia

Introduced into IPRL quarantine Dec 2023

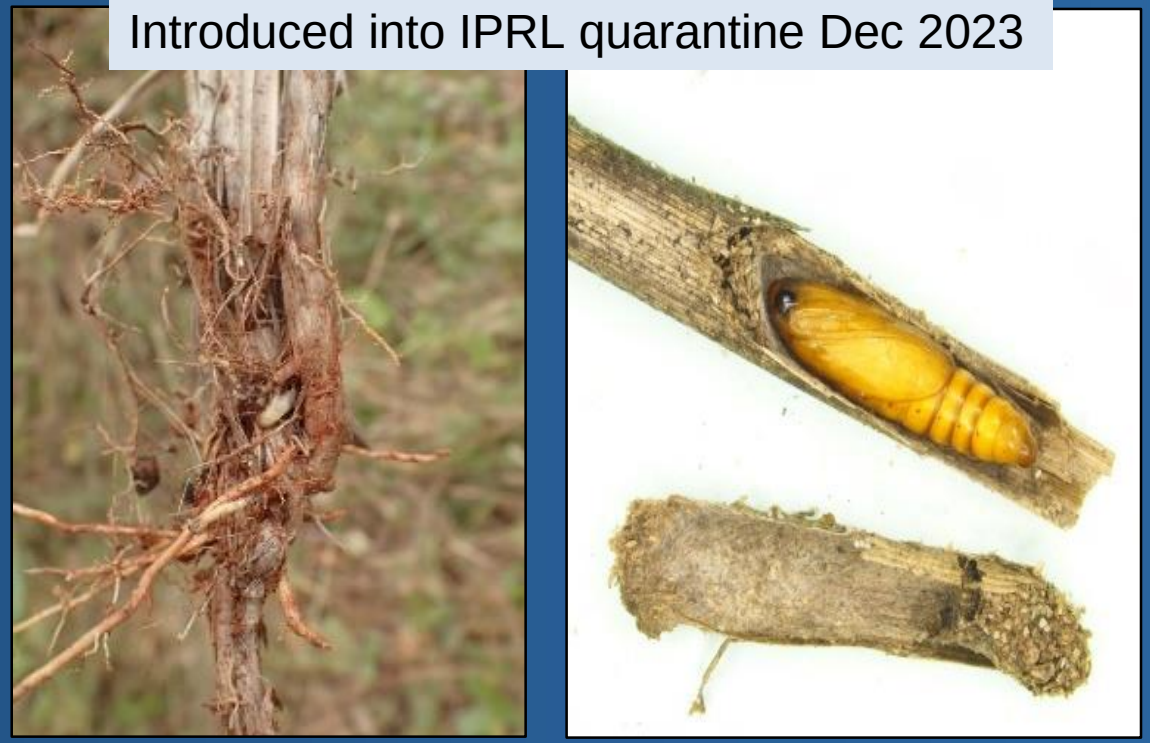


Larva tunnels in stems

Stem damage

***Atherigona* sp. (Diptera: Muscidae)**
Larva bores in young shoots
Larvae passed preliminary host range tests with *Sorghum* sp. and *Saccharum* sp.

Introduced into IPRL quarantine Dec 2023



Rhizome damage

Stem damage

Stem borer - *Emmalocera latilimbella*
Will weaken stem
Larvae passed preliminary host range tests with *Sorghum* sp.

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WATERHYACINTH *Pontederia (Eichhornia) crassipes*

Lead scientist: Melissa Smith, Ph.D.

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Waterhyacinth (*Pontederia crassipes*)

Waterhyacinth planthopper, *Megamelus scutellaris*

Waterhyacinth weevil, *Neochetina eichhorniae*

No Biological Control

Biological Control

Tipping et al. 2014

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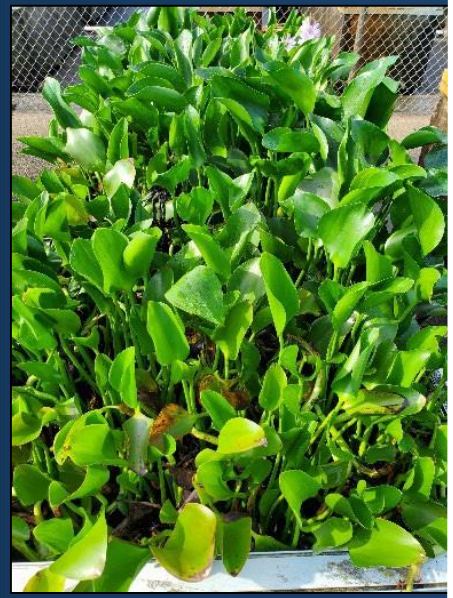
No Herbicide



No Biological control

Biological Control

Half Rate

Herbicide + No Biocontrol

Herbicide + Biocontrol

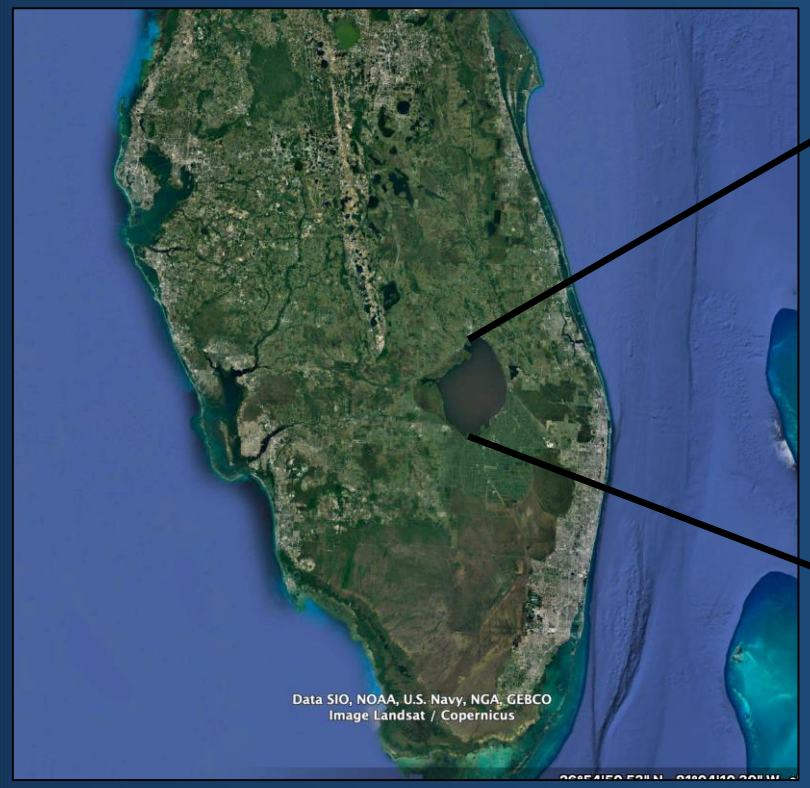
Label Rate

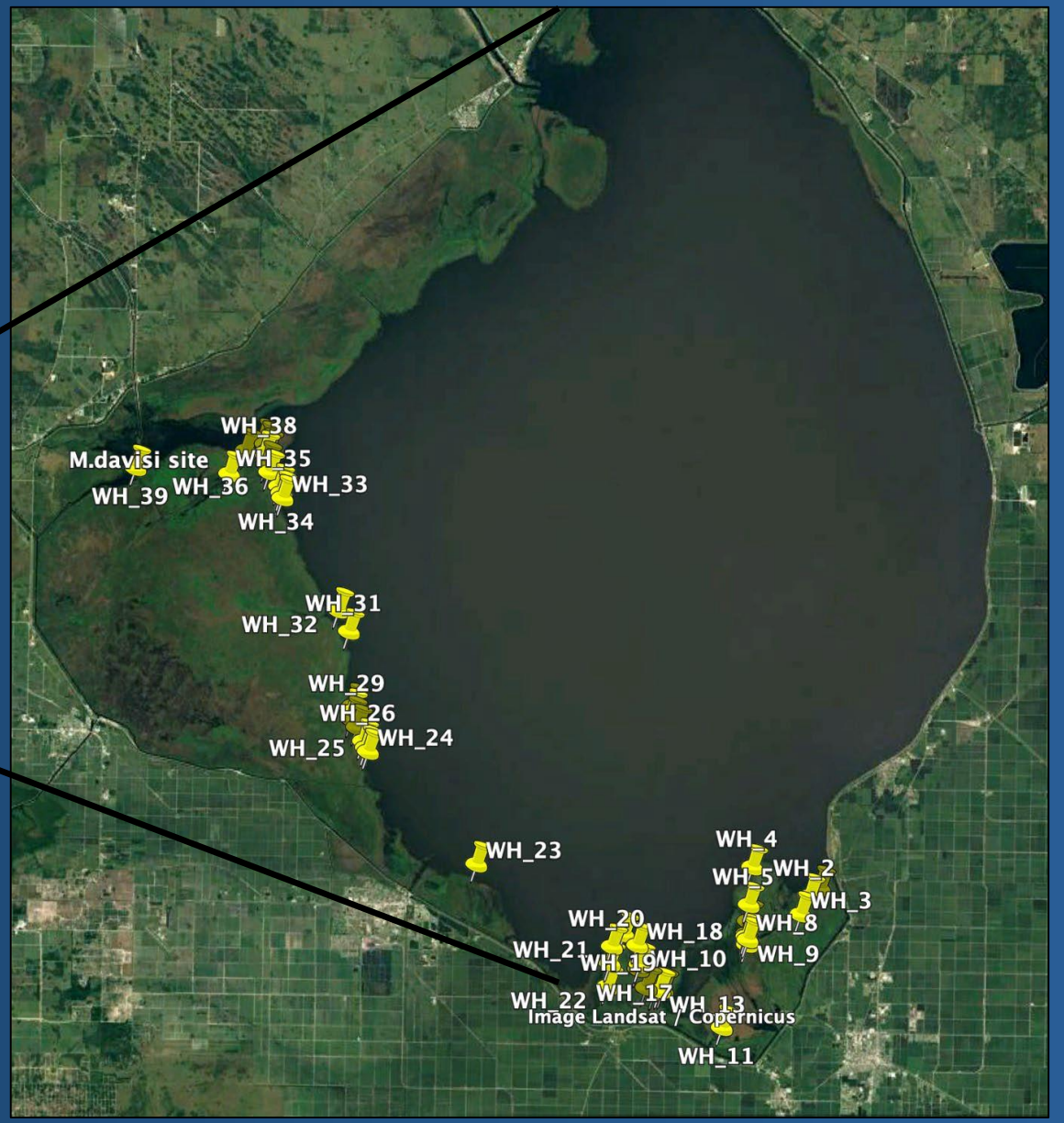
Herbicide + No Biocontrol

Herbicide + Biocontrol

22 weeks post treatment

Tipping et al. 2017; Goode et al. 2022





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MELALEUCA *Melaleuca quinquenervia* (Myrtaceae)

Lead scientist: Melissa Smith, Ph.D.

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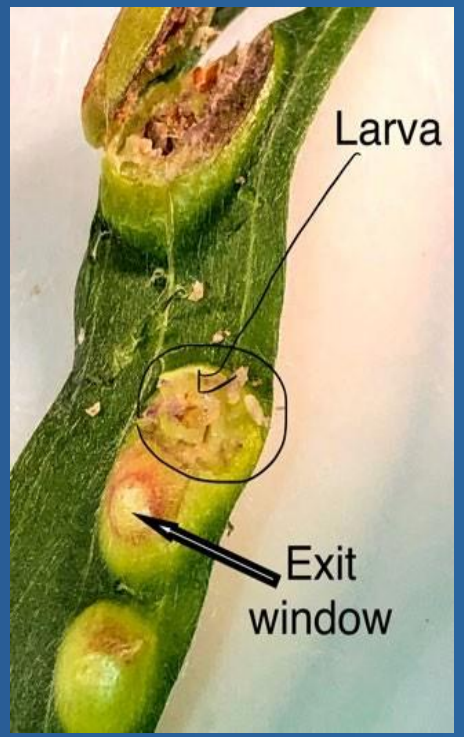
Melaleuca: *Lophodiplosis indentata*

- Approved for release in Fall 2022
- Inaugural release June 2023 at East Coast Buffer Water Preserve Area, few releases since



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Questions?