

U.S.D.A. Agricultural Research Service & University of Florida

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Biological Control Research
and Containment
Laboratory
Fort Pierce FL

Invasive Species Programs

- Biological Control of alligatorweed
- Description
 - No activity since the early 80s
- Objective
 - Suppress weed populations so as to foster their replacement by more desirable vegetation.
- Partners
 - ACOE, SFFCD, FDNR
- Start/End Dates
 - 1959 to 1973
- Status
 - 3 insects approved, 3 released, 3 established
- Funding (FY): none
- Annual Summary
 - Nothing new to report



Invasive Species Programs

- Biological Control of water hyacinth
- Description
 - Risk assessment
 - Release and establishment
 - Monitor impacts on weed population
- Objective
 - Suppress weed populations so as to foster their replacement by more desirable vegetation.
- Partners
 - SFWMD, FFWCC, ACOE, NPS
- Start/End Dates
 - 1968 to present
- Status
 - 3 insects approved, 3 released, 3 established, 1 awaiting approval
- Funding (FY): USDA= 200K, FFWCC=75K
- Annual Summary
 - Submitted permit to release *Megamelus*
 - Imported two more species to testing



Invasive Species Programs

- Biological Control of water lettuce
- Description
 - Monitor impacts on weed population
- Objective
 - Suppress weed populations so as to foster their replacement by more desirable vegetation.
- Partners
 - SFWMD, FFWCC, ACOE, NPS
- Start/End Dates
 - 1988 to 1998
- Status
 - 2 insects approved, 2 released, 2 established
- Funding (FY): none
- Annual Summary
 - Nothing new to report



Invasive Species Programs

- Biological Control of hydrilla
- Description
 - Exploration and risk assessment
 - Release and establishment
 - Monitor impacts on weed population
- Objective
 - Suppress weed populations so as to foster their replacement by more desirable vegetation.
- Partners
 - SFWMD, FFWCC, ACOE, NPS, SJRWMD, Osceola Co. (EPA)
- Start/End Dates
 - 1978 to present
- Status
 - 4 insects approved, 4 released, 1 established (*Hydrellia pakistanae*)
- Funding (FY): USDA= 75K, ACOE= 25K, FFWCC=130K , SJRWMD=50K, Osceola Co.= 75K
- Annual Summary
 - Continued exploration....



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- Biological
- Description
 - Risk a
 - Relea
 - Monito
- Objective
 - Suppr
 - replac
- Partners
 - SFWM
- Start/End
 - 1986 t
- Status
 - 4 inse
- Funding
- Annual S
 - Establ



waiting release
FWMD=150K,

Invasive Species Programs

- Biological Control of Brazilian peppertree
- Description
 - Risk assessment
 - Release and establishment
 - Monitor impacts on weed population
- Objective
 - Suppress weed populations so as to foster their replacement by more desirable vegetation.
- Partners
 - SFWMD, FFWCC, ACOE, NPS, DERM
- Start/End Dates
 - 1987 to present
- Status
 - 2 insects approved, 1 adventive insect established
- Funding (FY2008): USDA= 300K, FFWCC= 165 UF= 50K, SFWMD= 125K
- Annual Summary: continued exploration, testing, and petitioning



Invasive Species Programs

- Biological Control of Tropical Soda Apple
- Description
 - Risk assessment
 - Release and establishment
 - Monitor impacts on weed population
- Objective
 - Suppress weed populations so as to foster their replacement by more desirable vegetation.
- Partners
 - SFWMD, FFWCC, USDA, NPS
- Start/End Dates
 - 1994 to present
- Status
 - 1 insect approved, 1 released, 1 established
- Funding (FY2007): USDA-APHIS=25K
- Annual Summary
 - Released ~5K in ECISMA
 - Petitioning to release 2 more beetles



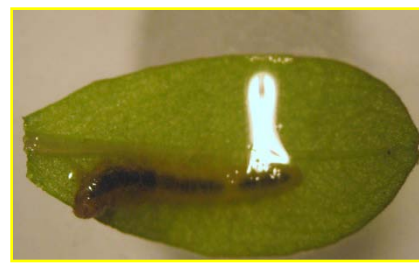
Invasive Species Programs

- Biological Control of *Lygodium microphyllum*
- Description
 - Foreign exploration
 - Release and establishment
 - Monitor impacts on weed population
- Objective
 - Suppress weed populations so as to foster their replacement by more desirable vegetation.
- Partners
 - SFWMD, FFWCC, NPS,
- Start/End Dates
 - 1997 to present
- Status
 - 3 insects approved, 2 released, 1 established?, 1 awaiting release
- Funding (FY): USDA=300K, SFWMD=150K, FFWCC=180K
- Annual Summary
 - Release gall mite
 - Moths defoliating stems at Jonathan Dickinson



Invasive Species Programs

- Biological Control of *Hygrophila polysperma*
- Description
 - Foreign exploration
- Objective
 - Suppress weed populations so as to foster their replacement by more desirable vegetation.
- Partners
 - FFWCC, Osceola Co. (EPA)
- Start/End Dates
 - 2007 to present
- Status
 - 4 insects and a rust fungus found in India
- Funding (FY): FFWCC= 35K, Osceola Co.=75K



Invasive Species Programs

- Biological Control of bromeliad weevil
- Description
 - Foreign exploration
 - Risk assessment
 - Release and establishment
 - Monitor impacts on weevil population
- Objective
 - Suppress insect populations....
- Partners
 - SFWMD, TSTAR, DPI, FL Bromeliad Soc
- Start/End Dates
 - 1998 to present
- Status
 - 1 insect approved, 1 released, 1 established?
- Funding (FY): SFWMD 17k, TSTAR 12k
- Annual Summary
 - Released > 2.5K in ECISMA



Future weed biocontrol agents

- **Broad-leaved paperbark** (*Melaleuca quinquenervia*)
 - Stem cutting weevil, leaf galling midge, etc...
- **Old World climbing fern** (*Lygodium microphyllum*)
 - Sawfly, stem mining moth
- **Brazilian pepper tree** (*Schinus terebinthifolius*)
 - Thrips, leaf mining moth, stemboring weevil, leaf feeding weevil, etc.
- **Australian Pine** (*Casuarina* spp.)
 - Seed feeders (complex)
- **Waterhyacinth** (*Eichhornia crassipes*)
 - Megamelus leaf hopper, Taosa plant hopper, Thripticus fly
- **Hydrilla** (*Hydrilla verticillata*)
 - Bagous weevil
- **Air potato** (*Dioscorea bulbifera*)
 - Lilioceris beetle
- **Wetland nightshade** (*Solanum tampicense*)
 - Anthonomus flower bud weevil



Future insect biocontrol agents

- **Lobate lac scale** (*Paratachardina* sp.)
 - *Parasitic wasp*
- **Bromeliad weevil** (*Metamasius callizona*)
 - *New biotype of parasitic fly*
- **Jamaican nightshade**
 - *Anthonomus flower bud weevil*



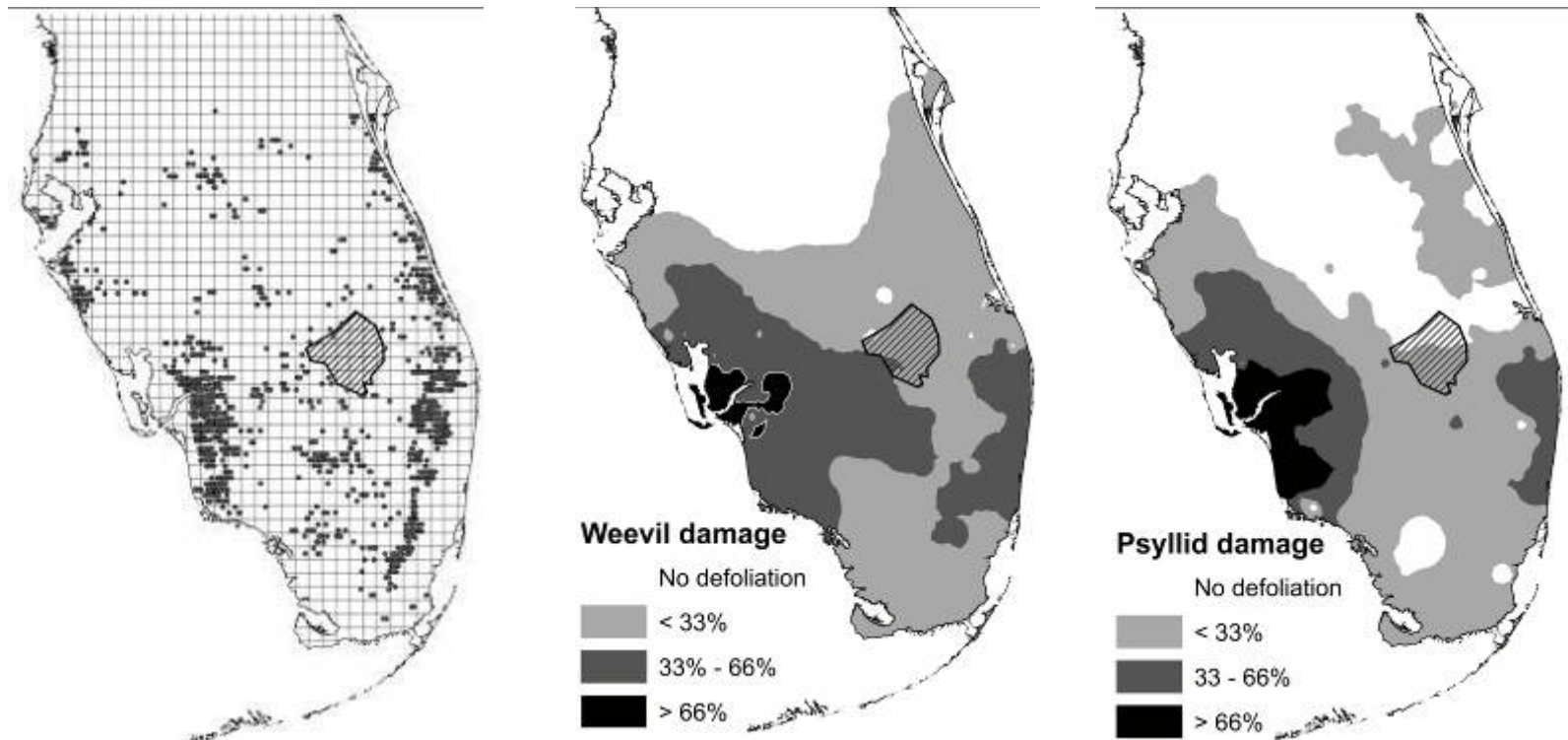
Monitoring

- Establishment
- Spread
 - Natural: slow (1-10 km/yr) but free
 - Redistribution: faster, directed, but time consuming
- Impacts
 - Local: small plots, long term studies
 - Mortality, species diversity, non-target, etc.
 - Regional: broad surveys, not site-specific
 - Patterns of control across landscape



Monitoring

- *Melaleuca* biocontrol agents



Monitoring

Tropical soda apple beetle

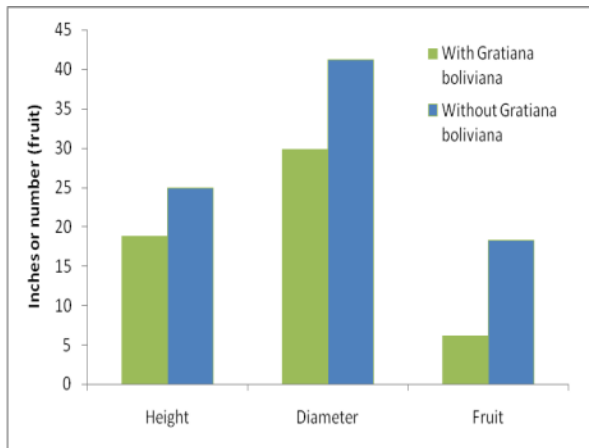
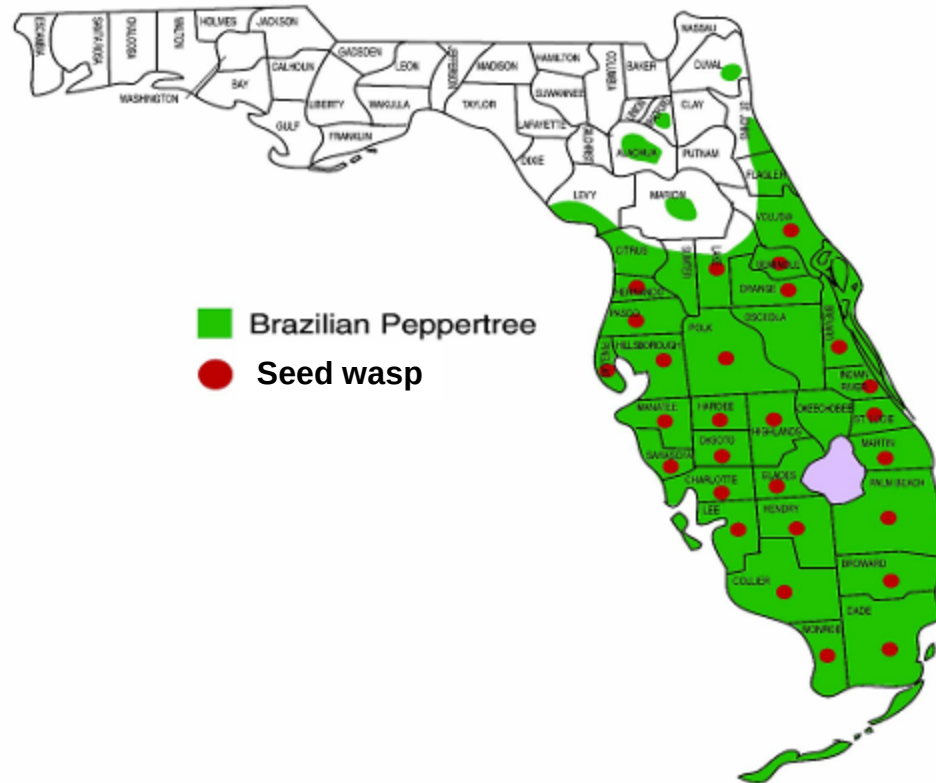


Figure . Effect of beetles on TSA plants.

Monitoring

- Fortuitous BP biocontrol agent
 - Regulation of Brazilian peppertree by adventive *Megastigmus* seed wasp from South Africa



Monitoring

- Bromeliad weevil biocontrol agent

Lake Rogers:
Jun, Sep, Dec,
Apr, Jun

Highlands
Hammock:
Oct 2007

Enchanted
Forest: Jul, Oct,
Jan, Apr, Jun

Savannas: Nov 2007

Collier-
Seminole
Feb 2008

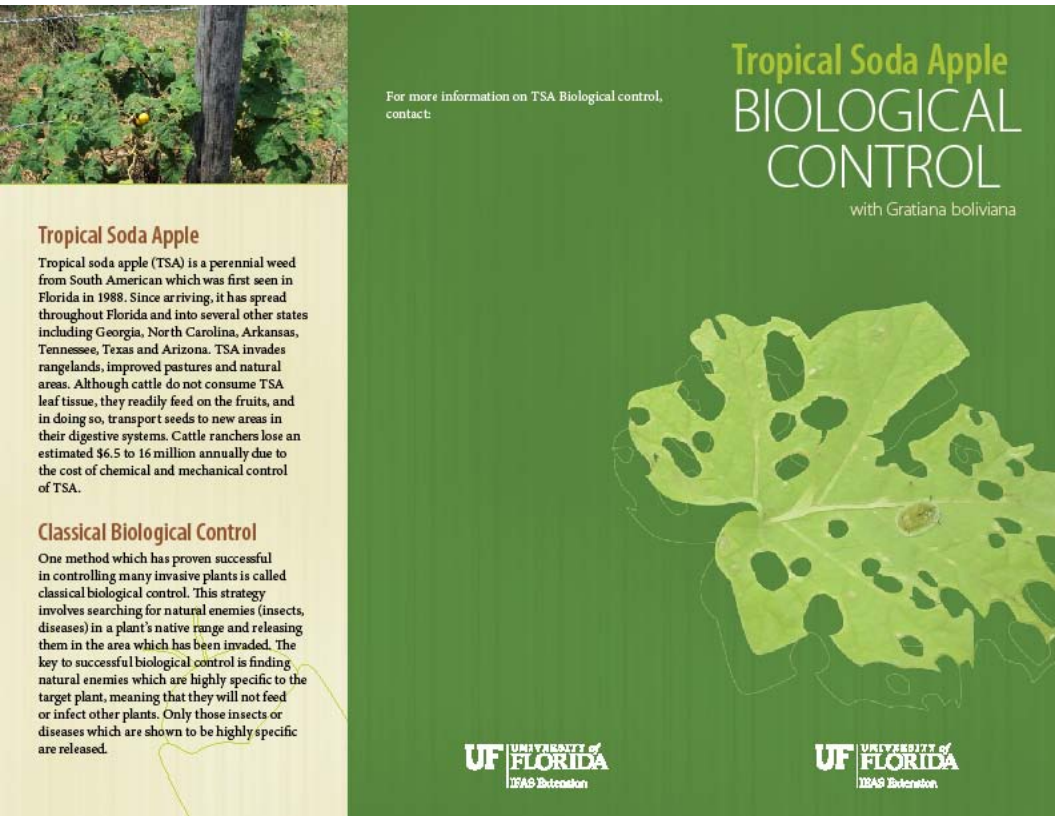
Big Cypress:
Aug, Nov, Feb,
May ...

Loxahatchee:
Jul, Oct, Jan,
Apr...

Fakahatchee
Strand, Jun
2008

Innovations and Successes

- Outreach



The brochure is titled "Tropical Soda Apple BIOLOGICAL CONTROL with *Gratiana boliviana*". It features a green background with a large, detailed illustration of a leaf with many holes, representing damage from the biological control agent. The text is organized into sections: "Tropical Soda Apple" and "Classical Biological Control".

Tropical Soda Apple

Tropical soda apple (TSA) is a perennial weed from South American which was first seen in Florida in 1988. Since arriving, it has spread throughout Florida and into several other states including Georgia, North Carolina, Arkansas, Tennessee, Texas and Arizona. TSA invades rangelands, improved pastures and natural areas. Although cattle do not consume TSA leaf tissue, they readily feed on the fruits, and in doing so, transport seeds to new areas in their digestive systems. Cattle ranchers lose an estimated \$6.5 to 16 million annually due to the cost of chemical and mechanical control of TSA.

Classical Biological Control

One method which has proven successful in controlling many invasive plants is called classical biological control. This strategy involves searching for natural enemies (insects, diseases) in a plant's native range and releasing them in the area which has been invaded. The key to successful biological control is finding natural enemies which are highly specific to the target plant, meaning that they will not feed or infect other plants. Only those insects or diseases which are shown to be highly specific are released.

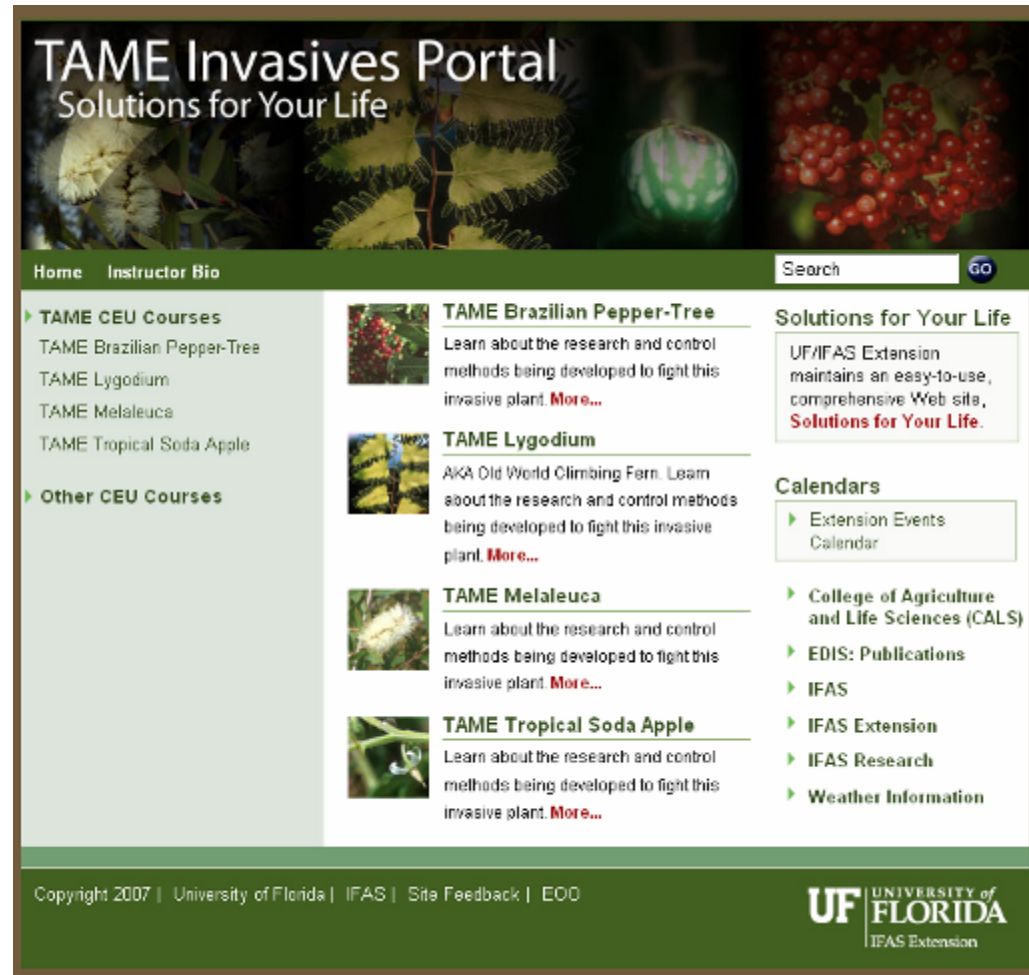
For more information on TSA Biological control, contact:

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Innovations and Successes

- Outreach



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TAME Lygodium
TAME Melaleuca
TAME Tropical Soda Apple

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Learn about the research and control methods being developed to fight this invasive plant. [More...](#)

TAME Lygodium
AKA Old World Climbing Fern. Learn about the research and control methods being developed to fight this invasive plant. [More...](#)

TAME Melaleuca
Learn about the research and control methods being developed to fight this invasive plant. [More...](#)

TAME Tropical Soda Apple
Learn about the research and control methods being developed to fight this invasive plant. [More...](#)

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