Biological Control of Tropical Soda Apple, *Solanum viarum* (Solanaceae) in Florida
A Successful Project

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Topics

- Introduction
- Gratiana boliviana (Chrysomelidae)
- Post-release evaluation
Invasive Plants

The second most important factor worldwide that reduce plant and animal biodiversity after urban development (house construction and roads)
Invasive Plants in Florida

- 1,392 non-native species established in Florida
- 76 species in Category I: alter plant communities
displacing native species, changing community structures or ecological functions (FEPPC)
- Invade 10% of Florida’s natural areas
- Cost $ 32 million/year to control in public land
One the Most Invasive Plants in Florida

- Tropical Soda Apple (Solanaceae: Solanum viarum)
Example of a Successful Biocontrol Project in Florida: Tropical Soda Apple

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Tropical Soda Apple

-Native to South America
(Brazil, Argentina, Paraguay, Uruguay)
-First found in Glade County, Florida in 1988
>0.4 million Hectares in 11 states

Spiny bush (1-2 m high) known as ‘The Plant from Hell’
Seeds (40,000/plant) dispersal by cattle and wildlife feeding on fruits (50-100 fruits/plant)
Foliage unpalatable

The plant is a host for at least six crop viruses (tomato mosaic virus, tomato mottle virus, potato leaf-roll virus, potato virus Y, tobacco etch virus, cucumber mosaic virus) and several crop pests
Tropical soda apple reduces biodiversity in natural areas and grasslands by displacing native plants and altering ecological processes.

Florida grasses replaced by Tropical Soda Apple.
Florida ranchers were losing US $6.5 to 16 million annually

Chemical control

Mechanical control

Reduction in livestock carrying capacity
States infested (green) with Tropical Soda Apple
First, Florida will be mine. And then the Southeast!

Not so fast, you prickly soda apple!
Gratiana boliviana
Leaf-beetle field release
Florida, May 2003
Beetles Released in Florida

Sumter County, June 2007

Sumter County, June 2007

Lake County, August 2008

Marion County, August 2008

Lake County, July 2009
Beetles Released in Florida

Okeechobee County, August 2007
Pasco County, July 2008
Sumter County, July 2008
Hernando County, July 2007
Lake County, June 2008
Florida counties where beetles have been released (green)
Polk County Field Cage 2003

May 14, 2003
Before beetles released

August 21, 2003
After beetles were released
August 11, 2004
Beetles being released

October 26, 2004
After beetles were released
Polk County

May 2003

June 2007

April 2008
Sumter County

June 2006

June 2007

April 2008
Post Release Evaluations in Florida

- Monitoring
- Mark plants and quadrants at each location
- Changes in the target weed and biocontrol agent recorded
Mean defoliation (%) of 20 TSA and total number of beetles in Polk County, FL 2003-05

TSA Defoliation (%)

Number of Beetles

Date
How Far *Gratiana boliviana* Disperse

- 1-2 miles/year (Polk, Martin counties)
- 8.3 miles/year (Lee County)
- 4-5 miles/year (Hendry County)
- 10 miles/year (Hardee County)
Manual sent to 1400 members of the Florida Cattlemen Association

Manual includes sections on:

- How to recognize TSA
- Beetle biology
- Damage/impact to TSA
- How to get beetles
- Where to release
- Monitoring and beetle harvest
- Integration of beetles with mowing and herbicides
minor point, but it was sent only to FCA members in central and south Florida (about 1400 out of 4000 members)

billover, 10/25/2010
Articles in newspapers and magazines facilitated the spread of word about the biological control program.
Survey-2010 of ranchers to assess the effectiveness of the program (3500 mailed, 30% responses)

Ranchers were more aware of the beetle in Central and South Florida

34%
71%
53%
Interagency cooperation in the implementation of the biological control of TSA played a key role for the overall success of the program.

1. Impact of TSA and availability of beetles
2. Development of technology
3. Diverse methods to deliver information
4. Feedback from stakeholders
Brazilian Collaborators

University of Blumenau

University of San Pablo

University of Irati

University of Curitiba