Control of Tropical Soda Apple

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UF-IFAS Range Cattle REC
Tropical Soda Apple
(Solanum viarum)

- Introduced into FL in late 1980’s
- Traditionally considered a S. FL problem
Native range of tropical soda apple
Characteristics of tropical soda apple:

- Same family as tomatoes, eggplants, potatoes, peppers.
- Perennial bush with thorny leaves and stem.
- Produces 150 fruits/plant with each containing 400-500 seeds (60,000-75,000 seeds per plant).
Identification

Seedling

Mature Plant

Flower

Thorns

Mature Fruit
Spreads by seed
tropical soda apple  
red soda apple  
sticky nightshade  
horsenettle  
red soda apple  
wetland nightshade  
nightshade
TSA Movement
Jefferson Co.
Areas of TSA Occurrence

- Tennessee
- Alabama
- Georgia
- Florida
- Puerto Rico
- Mississippi
- Alabama
- Georgia
- Puerto Rico
- Florida
- Louisiana
- Pennsylvania
- North Carolina
- South Carolina
- Texas
Control in the 1990s

- Remedy 1qt/A at bloom
  - But, you commonly see mature, seedling, blooming plants intermixed
- Mow in April, spray Remedy 60 days later.
- >90% control 30 DAT
- 50% control after 6 or 12 months
NEW TSA OPTIONS

- **Milestone**
  - aminopyralid
  - Use rate: 5 to 7 oz/A
  - Excellent control of TSA at any growth stage

- **GrazonNext HL**
  - aminopyralid + 2,4-D
  - Use rate: 2.1 pt/A
  - Excellent control of TSA + additional broadleaf weeds
Milestone (7 fl oz/ ac) - 71 DAT rating
Milestone plot (7 fl oz/ac) - 71 DAT rating - Payne Turf Farm
Milestone plot (7 fl oz/ac) - 71 DAT rating - Payne Turf Farm
note lack of any seedlings in these plots... none were found
## TSA Control

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Rate</th>
<th>3 MAT</th>
<th>6 MAT</th>
<th>12 MAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remedy</td>
<td>1 qt</td>
<td>90</td>
<td>70</td>
<td>50</td>
</tr>
<tr>
<td>Pasturegard</td>
<td>1.5 qt</td>
<td>80</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>Milestone</td>
<td>7 oz</td>
<td>95</td>
<td>90</td>
<td>85</td>
</tr>
</tbody>
</table>
TSA Control

- Milestone 1 oz/A
- Milestone 2 oz/A
- Milestone 4 oz/A
- Milestone 7 oz/A
- 2,4-D Amine 4 pt/A
- WeedMaster 4 pt/A
- Pasturegard 3 pt/A
- Remedy 2 pt/A
- Milestone 2 oz/A

Data points at 50 DAT, 150 DAT, and 335 DAT.
Residual TSA Control 75 DAT

% control

0 20 40 60 80 100

Milestone 5 oz/A
Milestone 6 oz/A
Milestone 7 oz/A
Remedy 2 pt/A
Milestone & GrazonNext

- Milestone provides excellent control of mature TSA plants at rates from 5 to 7 fl oz/acre
- Mowing followed by application to resprouting plants is not necessary
- Seasonal differences do not appear to affect the performance (except frost!)
- Excellent residual control for at least 6 months
- Follow up spot sprays will often be necessary
- Cheaper to apply than Remedy
- Now the herbicides of choice for TSA Control
Spot Spray TSA

- 0.5 to 0.8 oz Milestone per 2.5 gallons (0.25% v/v solution) + 0.25% surfactant
- GrazonNext at 1 oz/gallon
- Remedy at 0.5% v/v + 0.25% surfactant
- Glyphosate at 3% solution
Spot-Spraying TSA

- 0.04% Milestone
- 0.11% Milestone
- 0.18% Milestone
- 0.25% Milestone
- 0.5% Remedy

Bar chart showing the effectiveness of different concentrations of Milestone and Remedy treatments on whole-plant versus half-plant.
TSA Biological Control

- First insect released in 2003 in Polk Co.
- *Gratiana boliviana*
- Larvae and adults feed on TSA foliage
- 118 potential host plants were tested – the beetle only survived on TSA
Gratiana boliviana life stages

- Egg
- First
- Second
- Third
- Fourth
- Fifth
- Pupa

5 mm
Damage symptoms
Beetle effects on TSA performance

- Height
  - GB: A
  - No GB: B

- Diameter
  - GB: A
  - No GB: B

- Fruit
  - GB: A
  - No GB: B

cm or number vs. GB vs. No GB
Negative correlations between plant variables and beetle damage

Fruit
$r^2=0.10$, $P=0.03$

Plant height
$r^2=0.05$, $P=0.13$

Cover
$r^2=0.17$, $P=0.002$

Plant diameter
$r^2=0.08$, $P=0.04$
Results of a release in Saint Lucie Co.
1000 beetles released in August 2004

Buzz Eaves - Gratiana dynamics

Date

Gratiana/plant

08/27/04 09/22/04 10/26/04 11/16/04 02/02/05 03/29/05 05/20/05 07/22/05
Fruit production on control and release plants

note: control plants became infested from migrating beetles

Date

Number of fruits

08/27/04 10/26/04 16/16/04 02/02/05 03/29/05 05/20/05 07/22/05
Buzz Eaves - Fruits

Control
Release
Evaluation - Insecticide exclusion

- Plant height (cm)
  - Exclusion
  - Open

- Plant cover
  - Exclusion
  - Open

- Number of fruits/plant
  - Exclusion
  - Open

- Plant cover
  - Exclusion
  - Open

Evaluation - Insecticide exclusion
Before and after… Saint Lucie Co.

July 2006

October 2007
Before and after the beetle….Okeechobee Co.

June 2005

July 2005
TSA Biocontrol: SolviNix

- Tobacco Mild Green Mosaic Virus (TMGMV)
- Systemic; no need to spray entire plant
- 83-97% Mortality
- 200 milligrams/acre
- 5-10 dollars/acre
- Best when applied under hot/humid conditions