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

1987
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  horseradish  wetland nightshade

red soda apple  sticky nightshade  nightshade
TSA Movement
Jefferson Co.
Areas of TSA Occurrence

- Mississippi
- Alabama
- Georgia
- Puerto Rico
- Florida
- South Carolina
- North Carolina
- Pennsylvania
- Tennessee
- Texas
- Louisiana
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**
  - aminopyralid + 2,4-D
  - Use rate: 2.6 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
Milestone at 150 DAT
## 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

% control

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

50 DAT
150 DAT
335 DAT
Residual TSA Control 75 DAT

![Bar chart showing % control for different milestone doses and remedy.](chart.png)
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

Whole-plant vs. Half-plant comparison.
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**: Group A (GB) showing lower values compared to Group B (No GB).
- **Diameter**: Group A (GB) is significantly higher than Group B (No GB).
- **Fruit**: Group A (GB) shows a slight increase compared to Group B (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
Fruit production on control and release plants

note: control plants became infested from migrating beetles
Evaluation - Insecticide exclusion

- **Plant height (cm)**
  - April: Exclusion - 15 cm, Open - 10 cm
  - May: Exclusion - 20 cm, Open - 15 cm
  - June: Exclusion - 25 cm, Open - 20 cm
  - July: Exclusion - 30 cm*, Open - 25 cm
  - August: Exclusion - 35 cm*, Open - 30 cm
  - September: Exclusion - 40 cm*, Open - 35 cm
  - October: Exclusion - 45 cm*, Open - 40 cm

- **Plant cover**
  - April: Exclusion - 0.3 cm, Open - 0.2 cm
  - May: Exclusion - 0.5 cm, Open - 0.4 cm
  - June: Exclusion - 0.7 cm*, Open - 0.6 cm
  - July: Exclusion - 0.9 cm*, Open - 0.8 cm
  - August: Exclusion - 1.1 cm*, Open - 1.0 cm
  - September: Exclusion - 1.3 cm*, Open - 1.2 cm
  - October: Exclusion - 1.5 cm*, Open - 1.4 cm

- **Number of fruits/plant**
  - April: Exclusion - 1.0, Open - 0.5
  - May: Exclusion - 2.0, Open - 1.5
  - June: Exclusion - 3.0, Open - 2.5
  - July: Exclusion - 4.0*, Open - 3.5
  - August: Exclusion - 5.0*, Open - 4.5
  - September: Exclusion - 6.0*, Open - 5.5
  - October: Exclusion - 7.0*, Open - 6.5

* indicates significant difference.
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
At Application

3 Weeks