New Herbicides and Recommendations for the Most Common and Troublesome Weeds in Pastures

Brent A. Sellers
UF-IFAS Range Cattle REC
Outline

- Herbicides
- Dogfennel
- TSA
- Blackberry
- Thistle
- Pigweed (careless weed)
- Teaweeds
- Smutgrass
- Cogongrass
- Broomsedge
- Vaseygrass
- Sandbur
Outrider

- Sulfosulfuron
- Use rate: 1 to 2 oz/acre; 1.33 oz/acre standard
- Use for sedge/watergrass control
- Approximate cost is $12/oz
- Established bahiagrass, bermudagrass, stargrass & limpograss
- 28 DAP bermudagrass, stargrass & limpograss
Herbicide Update

- **Velpar**
  - Grazing restrictions reduced to 0 days (<4.5 pt/A)
  - Haying restrictions 38 days (<4.5 pt/A)
  - Forages
    - Bahiagrass
    - Bermudagrass
    - Others - you’re on your own
Herbicide Update

- **Pastora**
  - Nicosulfuron (Accent) and metsulfuron (Cimarron)
  - Labeled in April 2010
  - ESTABLISHED Bermuda only
  - Use Rate 1 to 1.5 oz/acre
  - Some yield loss during the growing season
    - 1 oz = 15% injury for 1 month; 5% by 40 days
    - 10 to 15% yield reduction from 1st cutting; no reduction by second cutting
    - Much safer if applied within 7 days after cutting
GrazonNext HL

GrazonNext
- 3.0 lb/gal (0.33 + 2.67 lb)
- 1.5 to 2.6 pt/a
  (24 to 41.6 fl oz/A)
- Standard use rate: 2 pt/A

GrazonNext HL
- 3.74 lb/gal (0.41 + 3.33 lb)
- 1.2 to 2.1 pt/A
  (19 to 34 fl oz/A)
- Standard use rate 1.6 pt/A

Cost is approximately $2 more per gallon for the HL formulation

Pasturegard HL: New rate structure is ½ the old rates of Pasturegard
Herbicides on the Horizon

- Aminocyclopyrachlor (MAT28)
  - MAT28 + metsulfuron (Rejuvra)
  - MAT28 + Telar
  - MAT28 + triclopyr (Invora)
  - MAT28 + 2,4-D
Troublesome Weeds
Dogfennel

- Dogfennel is the most encountered broadleaf weed in Florida pastures
  - Perennial plant
    - Dormancy: January to March
    - Bolting: April to July
    - Flowering: September to October
    - Seed Dispersal: November to December
  - Spread
    - Seed
    - Lateral rootstock growth
Dogfennel

- Dogfennel is a problem in grazing systems
  - Reduces light interception
  - Decreases forage production
  - Contains tremitol; dehydration
  - Dry season in FL occurs when dogfennel are small
    - Drought = reduced herbicide activity
      - Delay herbicide applications
Dogfennel

- Three species look very similar:
  - Dogfennel (*Eupatorium capillifolium*)
  - Yankeeweed (*Eupatorium compositifolium*)
  - False fennel (*Eupatorium leptophyllum*)
- Dogfennel and yankeeweed are very similar; yankeeweed is sticky and cauline leaves >1mm wide
- False fennel is distinguished by smaller stature and flowers only on one side of branches
Monthly Bahia Yield

Harvest Time

May, Jun, Jul, Aug, Sep, Oct

Biomass (lb/acre)

0
1000
2000
3000
4000
5000
6000
7000

NONE
LOW
MED
HIGH
# Dogfennel (30”) Control

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Cost</th>
<th>Rate</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>GrazonNext</td>
<td>10</td>
<td>2.0</td>
<td>60</td>
</tr>
<tr>
<td>GrazonNext</td>
<td>13</td>
<td>2.6</td>
<td>95</td>
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<tr>
<td>WeedMaster</td>
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<td>68</td>
</tr>
<tr>
<td>WeedMaster</td>
<td>9</td>
<td>3.0</td>
<td>86</td>
</tr>
<tr>
<td>PastureGard</td>
<td>18</td>
<td>3.0</td>
<td>98</td>
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</table>
### 42” Dogfennel; 60 DAT

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Cost</th>
<th>Rate</th>
<th>% Control (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$/acre</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GrazonNext</td>
<td>10</td>
<td>2 pt/acre</td>
<td>61 (3)</td>
</tr>
<tr>
<td>GrazonNext</td>
<td>13</td>
<td>2.6 pt/acre</td>
<td>66 (3)</td>
</tr>
<tr>
<td>GrazonNext + PastureGard</td>
<td>16</td>
<td>2 pt/acre + 1 pt/acre</td>
<td>93 (4)</td>
</tr>
<tr>
<td>GrazonNext + WeedMaster</td>
<td>16</td>
<td>2 pt/acre + 2 pt/acre</td>
<td>88 (10)</td>
</tr>
<tr>
<td>GrazonNext + 2,4-D amine</td>
<td>16</td>
<td>2 pt/acre + 2 qt/acre</td>
<td>95 (4)</td>
</tr>
</tbody>
</table>
Dogfennel Control

Control (%)

15 DAT
30 DAT
105 DAT
365 DAT

MAT28 1 OZ/A
MAT28 2 OZ/A
MAT28 3 OZ/A
MAT28 4 OZ/A
MAT28 6 OZ/A
MILE. 7 OZ/A
0.5 oz ai
1.0 oz ai
Dogfennel Control – 60 DAT

Control (%)

18 INCH
36 INCH

MAT28 1 OZ/A
MAT28 2 OZ/A
MAT28 3 OZ/A
MAT28 4 OZ/A
MAT28 6 OZ/A
G + C 2 + 14
G + C 2 + 20
28+MET 2 + 0.33
28 + D 2 + 16
Recommendations

- **<36 inches**
  - 3-4 pt/A 2,4-D
  - 3 pt/A 2,4-D + dicamba
  - 2 (1) pt/A Pasturegard (Pasturegard HL)

- **>36 inches**
  - 4 pt/A 2,4-D + dicamba
  - 3 (1.5) pt/A Pasturegard (Pasturegard HL)
  - 14-26.6 oz/A Cleanwave **PLUS**
    - 2 (1.6) pt/A GrazonNext (GrazonNext HL)
    - 4 pt/A 2,4-D Amine
TSA

- **Broadcast:** All forage grasses
  - Milestone 5 to 7 fl oz/acre
  - Grazonnext 2 to 2.6 pints/acre
    - Apply anytime during the year except when frost is likely (January through February)
    - Plants must be actively growing after frost events
    - Use in limpograss ONLY during November - April

- **Spot spraying:** All forage grasses
  - 0.11% v/v Milestone solution (3 tsp/gallon)
  - 1 oz/gallon for ForeFront/Grazonnext
  - Spray the entire plant
# 42” Dogfennel; 60 DAT

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Cost</th>
<th>Rate</th>
<th>% Control (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$/acre</td>
<td></td>
<td>Dog</td>
</tr>
<tr>
<td>GrazonNext</td>
<td>10</td>
<td>2 pt/acre</td>
<td>61</td>
</tr>
<tr>
<td>GrazonNext</td>
<td>13</td>
<td>2.6 pt/acre</td>
<td>66</td>
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<td>16</td>
<td>2 pt/acre + 2 qt/acre</td>
<td>95</td>
</tr>
</tbody>
</table>
TSA Control

![Bar chart showing control percentages for different treatments and time points. The chart includes treatments such as MAT28 1 OZ/A, MAT28 2 OZ/A, MAT28 3 OZ/A, MAT28 4 OZ/A, MAT28 6 OZ/A, and MILE 7 OZ/A, with control percentages ranging from 0 to 100%.}

Legend:
- 15 DAT
- 30 DAT
- 105 DAT
- 365 DAT
1 oz ai
2 oz ai
Blackberry Species in Florida

highbush blackberry
*Rubus argutus*

sand blackberry
*Rubus cuneifolius*

Photograph Credits: Shirley Denton
Blackberry Control-24 MAT

Results-Ona

Bahiagrass biomass (lb/A)

- Untreated
- 0.3 oz met
- 0.4 oz met
- 0.5 oz met
- 0.3 oz met + 2,4-D
- 0.4 oz met + 2,4-D
- 0.5 oz met + 2,4-D

*Note: Treatments marked with the same letter are not significantly different.*
Blackberry Control

- 0.5 oz met + 2,4-D
- 0.4 oz met + 2,4-D
- 0.3 oz met + 2,4-D
- 0.5 oz met
- 0.4 oz met
- 0.3 oz met
- Untreated

Groundcover (% of initial)
Blackberry

- Full vs. reduced rates
  - Remedy
    - Full rate = rapid brown out
    - 1 pt/A = slower brown out
  - Telar
    - 1.0 oz/acre – more consistent
  - Chaparral
    - Apply only in late fall after bahia is dormant
    - Addition of 2,4-D helpsafen bahiagrass
Dewberry

- Telar 1 oz/A
  - Repeated applications are necessary
Thistle Control

- Biennial species
- Two species are most numerous
  - Nuttall’s thistle
  - Horrible/purple thistle
- Control is always better when sprayed at the rosette growth stage
Thistle Growth Stages

Rosette

Bolting
Thistle Control with Milestone

![Graph showing percent control of rosette and bolting at different Milestone rates.]

- **Percent control**
- **Milestone Rate**
  - 0.5 fl oz
  - 1.0 fl oz
  - 2.0 fl oz
  - 4.0 fl oz

**Legend**
- Orange: Rosette
- Blue: Bolting

**Milestone Rate**

- 0
- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100

**Percent control**

- 0
- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100

**Milestone Rate**

- 0.5 fl oz
- 1.0 fl oz
- 2.0 fl oz
- 4.0 fl oz
Comparing Milestone with Standards

Percent control
Rosette
Bolting

Milestone 1 fl oz
Milestone 3 fl oz
Weedmaster 2 pt
Weedmaster 3 pt
2,4-D Amine 1 qt
2,4-D Amine 2 qt
Pigweed (Careless weed)

- Annual plants
  - Redroot pigweed
  - Smooth pigweed
  - Spiny pigweed
  - Palmer amaranth
  - Livid amaranth
  - etc.

- Prolific seed producers (600,000/plant!!!!)
- Require light for germination
- Generally see new flushes after rainfall
Pigweed Control

- 0.1 oz/acre Telar
- 4 oz/acre Milestone
- 1.5 pt/acre Forefront
- 2 oz/acre Chaparral
0.1 oz/acre Telar 30 DAT
1.5 pt/acre GrazonNext 30 DAT
Typical Pigweed Re-infestation
Teaweeds
Smutgrass

- Two species in Florida
  - Small smutgrass
  - Giant Smutgrass
- Control
  - 4 pt Velpar-rainy season
  - No surfactant is required
- Grazing restriction = 0; 38 d haying restriction
What We Know

- Cultural inputs alone are unsuccessful
- Chemical control alone is successful initially
- Integrated strategy for extended control is needed
  - Seed biology
  - Competition
  - Cultural plus chemical control
Diurnal Temperature Flux

Germination (%)

Small smutgrass
Giant smutgrass

Alternating Temperature (°C)

22/11 27/15 33/24 29/19

Germination (%)
Seed Summary

- Seed germination was higher at diurnal temperature flux than at constant temperatures
  - Both varieties germinated equally well at spring and fall temperature flux
  - Lower germination of small (59%) and giant (53%) smutgrass at summer and winter temperature flux, respectively
  - Small prefers moist and cool, and giant prefers moist and hot
Bahiagrass : Giant Smutgrass (pH 5.5)

The graph shows the relative shoot weight (g) of Bahiagrass and Giant Smutgrass across different proportions of Bahiagrass to Giant Smutgrass (8B:0S, 6B:2S, 4B:4S, 2B:6S, 0B:8S). The y-axis represents the relative shoot weight, while the x-axis represents the proportion of Bahiagrass to Giant Smutgrass.
# Replacement Series Summary

## Bahiagrass: Giant Smutgrass

<table>
<thead>
<tr>
<th>pH</th>
<th>4 plants/pot</th>
<th>8 plants/pot</th>
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</thead>
<tbody>
<tr>
<td>4.5</td>
<td>B</td>
<td>G</td>
</tr>
<tr>
<td>5.5</td>
<td>B</td>
<td>G</td>
</tr>
<tr>
<td>6.5</td>
<td>B</td>
<td>G</td>
</tr>
</tbody>
</table>
4B:4S (pH 4.5)

Bahiagrass

Giant
4B:4S (pH 5.5)

Bahiagrass  Giant
4B:4S (pH 6.5)

Bahiagrass

Giant Smutgrass
4Bahiagrass:4Giant Smutgrass

Mean shoot weight/plant (g)

- **Bahiagrass**
- **Giant Smutgrass**

<table>
<thead>
<tr>
<th>pH</th>
<th>Mean Shoot Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5</td>
<td>c</td>
</tr>
<tr>
<td>5.5</td>
<td>a</td>
</tr>
<tr>
<td>6.5</td>
<td>b</td>
</tr>
</tbody>
</table>

Legend:
- **c**
- **a**
- **b**
Replacement Series Summary

Bahiagrass: Small Smutgrass

<table>
<thead>
<tr>
<th>pH</th>
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</tr>
</thead>
<tbody>
<tr>
<td>4.5</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>5.5</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>6.5</td>
<td>B</td>
<td>S</td>
</tr>
</tbody>
</table>
4B:4S (pH 4.5)

Bahiagrass

Small Smutgrass
4B:4S (pH 5.5)

Bahiagrass

Small Smutgrass
4B:4S (pH 6.5)

Bahiagrass  Small Smutgrass
4Bahiagrass : 4Small Smutgrass

<table>
<thead>
<tr>
<th>pH</th>
<th>Mean Shoot Weight/Plant (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5</td>
<td>0</td>
</tr>
<tr>
<td>5.5</td>
<td>1</td>
</tr>
<tr>
<td>6.5</td>
<td>2</td>
</tr>
</tbody>
</table>

- **Bahiagrass**
  - 4.5: bc
  - 5.5: b
  - 6.5: b

- **Small Smutgrass**
  - 4.5: c
  - 5.5: b
  - 6.5: b
# Field Experiment 1

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Year</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hexazinone (1.12)</td>
<td>2008</td>
<td>2.80 a</td>
<td>0.48 bc</td>
<td>0.13 cd</td>
<td>0.18 bc</td>
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<td>Renovation (4.48)</td>
<td>2009</td>
<td>2.88 a</td>
<td>5.53 a</td>
<td>0.23 bc</td>
<td>0.60 b</td>
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<tr>
<td>Fall roller chopping</td>
<td>2010</td>
<td>0.33 bc</td>
<td>0.03 d</td>
<td>0.39 b</td>
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# Field Experiment 2

<table>
<thead>
<tr>
<th>Treatments</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
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</thead>
<tbody>
<tr>
<td>Velpar</td>
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<td>0</td>
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<tr>
<td>0.56 kg/ha</td>
<td>2</td>
<td>0.1</td>
<td>0</td>
<td>0.3</td>
</tr>
<tr>
<td>56 kg/ha</td>
<td>0.6</td>
<td>0.8</td>
<td>0.7</td>
<td>0.3</td>
</tr>
<tr>
<td>0 kg/ha</td>
<td>2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.6</td>
</tr>
<tr>
<td>0 kg/ha</td>
<td>2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.6</td>
</tr>
<tr>
<td>0 kg/ha</td>
<td>2</td>
<td>0.1</td>
<td>0.1</td>
<td>0.7</td>
</tr>
<tr>
<td>0 kg/ha</td>
<td>2</td>
<td>0.1</td>
<td>0</td>
<td>0.3</td>
</tr>
<tr>
<td>Treatments</td>
<td>2008 Hexazinone rate (kg a.i. ha(^{-1}))</td>
<td>2009 Hexazinone rate (kg a.i. ha(^{-1}))</td>
<td>No. of plants plot(^{-1}) (24 MAT)</td>
<td>Annual Cost in 2008 ha(^{-1}) ($)</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>-------------------------------</td>
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<tr>
<td>0.00</td>
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<td>0.56</td>
<td>12.7 abcdef</td>
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<td>50.00</td>
</tr>
<tr>
<td>0.00</td>
<td>0.84</td>
<td>5.0 efg</td>
<td>0.00</td>
<td>76.00</td>
</tr>
<tr>
<td>0.56</td>
<td>0.56</td>
<td>1.0 fg</td>
<td>50.00</td>
<td>50.00</td>
</tr>
<tr>
<td>0.56</td>
<td>0.84</td>
<td>1.3 fg</td>
<td>50.00</td>
<td>76.00</td>
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<td>0.84</td>
<td>0.00</td>
<td>2.5 cdefg</td>
<td>76.00</td>
<td>0.00</td>
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<tr>
<td>0.84</td>
<td>0.56</td>
<td>0.8 g</td>
<td>76.00</td>
<td>50.00</td>
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<td>0.84</td>
<td>0.84</td>
<td>4.7 g</td>
<td>76.00</td>
<td>76.00</td>
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<tr>
<td>1.12</td>
<td>0.00</td>
<td>1.5 g</td>
<td>100.00</td>
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<tr>
<td>1.12</td>
<td>0.56</td>
<td>4.8 bcdefg</td>
<td>90.00</td>
<td>50.00</td>
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<tr>
<td>1.12</td>
<td>0.84</td>
<td>1.2 defg</td>
<td>90.00</td>
<td>76.00</td>
</tr>
</tbody>
</table>
Cogongrass (*Imperata cylindrica*)
Cogongrass Biology

- $C^4$ species
- Rhizomatous, warm season, invasive perennial
- Present on every continent except Antarctica
  - 200 million acres world-wide
- Rhizome formation begins at the 3-4 leaf stage
- Seed production $= 3,000$ seeds/plant
  - Viability and germination is variable among populations
Cogon Dominance

- Grows best in moderate soils with low pH, fertility and O.M.
- Adapted to full sun, but has a light compensation point of 32-35 μmol/m²/s
- Subtropical and tropical areas
  - Dry cycle-leaf death-sacrifice for rhizome biomass
    - Lots of dead leaf biomass; doesn’t decay
    - Pyrogenic
- Allelopathy
  - Chemical
  - Mechanical injury from rhizomes on other plants
Cogongrass
Cogongrass Control With Tillage

- Farm it out!
  - Repeated, frequent tillage that breaks up the entire rhizome layer is effective
- Recreational tillage FAIL
  - Infrequent tillage spreads cogongrass rhizomes and seed
  - Tillage for wildlife food plots can be a major source of cogongrass spread
- Cutting firebreaks can also spread rhizomes
Herbicides that do work

- **Glyphosate**
  - 3-4 lb ae/A
  - 2-5% v/v depending on the product

- **Imazapyr**
  - 0.5-1 lb ai/A
  - 0.5%-2% v/v depending on the product
Control Versus Eradication: What does eradication really mean?

- The complete elimination of ALL living propagules, including sexual and asexual.
What works:
(99% reduction in rhizomes over three years)

- **Imazapyr** (1X per year)
  - Spring, summer, or fall
- **Glyphosate** (2X per year)
  - Spring + fall
- **Imazapyr + Glyphosate** (1X per year)
  - Spring, summer, or fall
  - Not any better than imazapyr alone
What is iffy

- Glyphosate (1X per year)
  - Summer
    - ~80% reduction at Degussa
    - ~95% reduction at Bayou LaBatre
  - Fall
    - ~75% reduction at Degussa
    - ~83% reduction at Bayou LaBatre
- ± 5 different species
- No selective herbicides
- Spot-treat with glyphosate in bahia & limpo
- Broadcast glyphosate at 1 pt/A immediately after harvest in bermudagrass & stargrass
# Broomsedge & Soil

<table>
<thead>
<tr>
<th>Location</th>
<th>pH</th>
<th>P</th>
<th>K</th>
<th>Mg</th>
<th>Ca</th>
<th>Cu</th>
<th>Mn</th>
<th>Zn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardee</td>
<td>5.9</td>
<td>42</td>
<td>11</td>
<td>12</td>
<td>1382</td>
<td>0</td>
<td>0.09</td>
<td>1.46</td>
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<tr>
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<td>275</td>
<td>0</td>
<td>0.15</td>
<td>0.74</td>
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<tr>
<td>Polk**</td>
<td>6.0</td>
<td>105</td>
<td>17</td>
<td>26</td>
<td>872</td>
<td>1.37</td>
<td>1.12</td>
<td>19.39</td>
</tr>
<tr>
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<td>2</td>
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<td>11</td>
<td>356</td>
<td>0</td>
<td>0</td>
<td>6.55</td>
</tr>
</tbody>
</table>

** Broomsedge population has declined
Cumulative Broomsedge Height

![Graph showing cumulative height growth over weeks for different treatments (4.5, 5.5, 6.5)]
Vaseygrass

- Bahia = no options other than spot-trt
- Limpo = don’t overgraze; no options
- Bermudagrass & stargrass
  - 1.5 oz/A Pastora fb 1.0 oz/A ($$$$$$$)
  - 1 – 2 pt/A glyphosate after cutting
  - 1 oz/A Pastora + 1 pt/A glyphosate
Sandbur

- Bahia = no options
- Bermudagrass
  - 1.5 oz/A Pastora fb 1.0 oz/A ($$$$$$$$
  - 1 – 2 pt/A glyphosate after cutting
  - 1 oz/A Pastora + 1 pt/A glyphosate
- Stargrass
  - 1 – 2 pt/A glyphosate after cutting
Links of Interest

- Weed Management in Pastures and Rangeland – 2012: http://edis.ifas.ufl.edu/WG006
- Weed Science Extension Website: www.uflweed.com