Getting to the Root of Problem: Cogongrass Patch Eradication is Possible

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Cogongrass  *Imperata cylindrica* (L.) P. Beauv.
Strong asexual reproduction from rhizomes
Cogongrass Infestations by County in the Southeast U.S.

As reported to State Authorities by May 2010
All known infestations in South Carolina, Georgia and Tennessee are under treatment

Map produced by the Center for Invasive Species and Ecosystem Health
University of Georgia in Cooperation with States
What Does Eradication Really Mean?

• The complete elimination of ALL living propagules, including sexual and asexual...
Eradication Definition (Part 2)

• The complete elimination of ALL living propagules, including sexual and asexual...

• ...within a defined boundary
  – Single patch
  – County
  – State
  – Nation
  – Continent
Wildfire Paradigm of Invasive Plant Management

Protect Special Habitats

Stop the Advancing Front

Eradicate the Outliers

Maintain the Clear Zone
Previous Cogongrass Control Research

• Previous studies have found strategies that provide satisfactory “control”
  – Faircloth, 2004
  – Ramsey et al, 2003
  – Johnson et al, 1999

• No published study has found the treatment and timing combination that leads to eradication
Objectives

• To determine the role of the herbicides glyphosate and imazapyr for cogongrass eradication
  – Should they be used alone or in combination?
  – What is the optimal timing (spring, summer or fall?)
Herbicide Treatments

- Herbicides broadcast applied at 20 GPA
  - Glyphosate 4 lb/A + NIS 0.25% v/v
    - Accord Concentrate (3 qt/A)
    - = 3.75% v/v
  - Imazapyr 0.75 lb/A + MSO (1% v/v)
    - Chopper Gen2 (3 pt/A)
    - = 1.75% v/v
  - Glyphosate (4 lb/a) + Imazapyr (0.75 lb/a) + MSO
    - Accord Conc. + Chopper Gen2
    - = 3.75% + 1.75% v/v
Treatment Timings

• May and October (2 apps per year)
  – Glyphosate

• May (1 app per year)
  – Imazapyr
  – Imazapyr + glyphosate

• August (1 app per year)
  – Glyphosate
  – Imazapyr
  – Imazapyr + glyphosate
Treatment Timings Cont.

• October (1 app per year)
  – Imazapyr
  – Glyphosate
  – Imazapyr + glyphosate

• Treatments were applied in 2008, 2009, 2010
Data Collection

• Data was collected three times a year
  – Visual % control
  – Live cogongrass cover
  – Shoot biomass
  – Live rhizome biomass per 0.25 m$^2$
    • Sampled entire rhizome depth
  – Rhizome total non structural carbohydrate (TNC) content
70-80 lbs
8-10 inches depth
Statistical Analysis

• Rhizome biomass Data were analyzed using proc glimmix

• Fixed effects
  – Location, herbicide, timing and MAT

• Random effects
  – Replication, replication x herbicide and replication x timing
Results
Rhizome biomass (g/0.25m²)

- **Tilman's Corner**
- **Bayou La Batre**

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<th>Date</th>
<th>Tilman's Corner</th>
<th>Bayou La Batre</th>
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<td>90</td>
</tr>
<tr>
<td>7/1/11</td>
<td>100</td>
<td>80</td>
</tr>
</tbody>
</table>
Glyphosate (May and October each year)

Rhizome biomass (g/0.25m²)

- **Tilman's Corner**
- **Bayou La Batre**

Spray dates:
- 4/1/08
- 6/1/08
- 10/1/08
- 1/1/09
- 4/1/09
- 7/1/09
- 10/1/09
- 1/1/10
- 4/1/10
- 7/1/10
- 10/1/10
- 1/1/11
- 4/1/11
- 7/1/11
Rhizome biomass (g/0.25m²)

Glyphosate (1 app/yr in August)

Tilman's Corner
Bayou La Batre

4/1/08 7/1/08 10/1/08 1/1/09 4/1/09 7/1/09 10/1/09 1/1/10 4/1/10 7/1/10 10/1/10 1/1/11 4/1/11 7/1/11
Glyphosate (1 app/yr in October)

Rhizome biomass (g/0.25m²)

- **Tilman's Corner**
- **Bayou La Batre**

Data points:
- 4/1/08: 200
- 7/1/08: 180
- 10/1/08: 160
- 1/1/09: 140
- 4/1/09: 120
- 7/1/09: 100
- 10/1/09: 80
- 1/1/10: 60
- 4/1/10: 40
- 7/1/10: 20
- 10/1/10: 0
- 1/1/11: 50
- 4/1/11: 30
- 7/1/11: 10

The graph shows the decline in rhizome biomass due to the application of glyphosate in October each year.
Glyphosate Summary

• 2 treatments per year effective
  – 3-6 treatments needed for these two sites

• August and October annual treatments varied by site
  – Don’t wait 12 months to go back with glyphosate

• Glyphosate recommendations
  – 4 lb ai/A (broadcast)
  – 4% v/v of a minimum 41% ai product (Spot)
  – Add NIS when needed
Imazapyr (1 app/yr in May)

Rhizome biomass (g/0.25m²)

- Tilman's Corner
- Bayou La Batre

Spray markers indicate application dates.
Rhizome biomass (g/0.25m²)

Imazapyr (1 app/yr in August)

- Tilman's Corner
- Bayou La Batre

Spray dates:
- 4/1/08
- 7/1/08
- 10/1/08
- 1/1/09
- 4/1/09
- 7/1/09
- 10/1/09
- 1/1/10
- 4/1/10
- 7/1/10
- 10/1/10
- 1/1/11
- 4/1/11
- 7/1/11
Rhizome biomass (g/0.25m²)

Imazapyr (1 app/yr in October)

- Deg Imaz 1X Oct
- BLB Imaz 1X Oct

Spray dates:
- 4/1/08
- 7/1/08
- 10/1/08
- 1/1/09
- 4/1/09
- 7/1/09
- 10/1/09
- 1/1/10
- 4/1/10
- 7/1/10
- 10/1/10
- 1/1/11
- 4/1/11
- 7/1/11
Imazapyr Summary

• 2-3 annual treatments at any time worked
• Imazapyr recommendations
  – 0.75 lb ai/A broadcast
  – 2% v/v for a 2 lb ai/gal formulation (spot)
  – Add NIS or MSO
• Not to be used under hardwoods
• Repeated high rates cannot be safely used under longleaf and slash pine
Glyphosate + Imazapyr Summary (Data not shown)

• At these rates, no benefit to tank mixing for cogongrass rhizome kill
  – NO better than imazapyr alone

• Georgia is successfully using the tank mix for patch eradication
Bottom Line

• Both glyphosate and imazapyr provide good “control”

• Eradication of patches is possible
  – Repeated apps can kill the entire rhizome layer
  – Not all cogongrass patches will be killed equally fast
Eradication Study Sponsors

• USDA Forest Service Southern Research Station
• Alabama Agricultural Experiment Station
• Auburn University
• Evonik Degussa (formerly Degussa)
• Alabama Department of Conservation and Natural Resources State Lands Division
Questions?

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