Weed control and herbicides used in Florida sugarcane

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Sugarcane production in Florida

- Approximately 400,000 acres of sugarcane
  - 74% on organic/muck soils of the EAA
    - >30% organic matter
  - 26% on mineral soils
    - <20% organic matter
Florida sugarcane crop cycle

• 3-to-4-year crop cycle
  – Plant cane – 28.5%
  – Ratoon cane – 71.5%
    • 1\textsuperscript{st} ratoon (29.5%), 2\textsuperscript{nd} ratoon (29.1%), 3\textsuperscript{rd} ratoon (9.8%), 4\textsuperscript{th} ratoon or older (3.1%)

• Planting season: mid-August to early-January
  • Following fallow period
    – Bare fallow, rotation with other crops, or flooding following final ratoon
  • Successive
    – Replanting after the final ratoon (no fallow period)
      – Not recommended in fields with heavy grass pressure especially where bermudagrass is prevalent

• Harvest season: mid-October to April/May
• Planting and harvesting coincides with dry season
Sugarcane planting
Weeds in Florida sugarcane

Burning fields prior to harvest → No straw → Mostly grasses and small seeded broadleaf weeds

Green harvesting (e.g. Brazil) → more straw → less grasses → mostly large seeded broadleaf weeds
Weeds in Florida sugarcane

**Grasses**

**Most prevalent**
- Fall panicum
- Bermudagrass

**Others**
- Goosegrass
- Crabgrasses
- Crowfoot grass
- Columbus grass
- Elephantgrass
- Field sandbur
- Torpedograss

**Sedges**

**Most prevalent**
- Yellow nutsedge
- Purple nutsedge
Weeds in Florida sugarcane

Most prevalent broadleaf weeds
- Common lambsquarters
- Spiny amaranth
- Common ragweed
- American black nightshade

Others
- Common purslane
- Sickle pod
- Coffee senna
- Alligatorweed
- Morning glories (late in the season)
Weed control: mechanical
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Weed control: cultural

Sweet corn rotation
Weed control: cultural

Lettuce rotation
Weed control: cultural

Rice rotation
Weed control: herbicides

- Applied preemergence, postemergence, post-directed
- Accurate herbicide application timing and proper calibration of application equipment are extremely important to maximize weed control and herbicide selectivity
# Preemergence herbicides

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>MOA</th>
<th>Chemical family</th>
<th>Group</th>
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<tbody>
<tr>
<td>Atrazine</td>
<td>Photosystem II inhibitor</td>
<td>s-triazine</td>
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<tr>
<td>Pendimethalin</td>
<td>Microtubule inhibitor</td>
<td>Dinitroaniline</td>
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<tr>
<td>S-metolachlor + Atrazine + Mesotrion</td>
<td>Long-chain fatty acid Photosystem II inhibitor HPPD inhibitor</td>
<td>Chloroacetamide s-triazine Triketone</td>
<td>15 5 27</td>
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<tr>
<td>Mesotrion</td>
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<tr>
<td>Clomazone</td>
<td>Diterpene synthesis inhibitor</td>
<td>Isoxazolidinone</td>
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<tr>
<td>Diuron</td>
<td>Photosystem II inhibitor</td>
<td>Phenylurea</td>
<td>7</td>
</tr>
<tr>
<td>Glyphosate</td>
<td>EPSP synthase inhibitor</td>
<td>Organophosphorus</td>
<td>9</td>
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Most commonly used PRE herbicides

- **Atrazine (4 – 8 pt/acre)**
  - Broadleaf weeds
  - Tank-mixed with Prowl H₂O (4.2 – 8.4 pt/acre) for grass control
- **Metribuzin (1 - 2⅓ lb/acre)**
  - Broadleaf weeds and some grasses
  - Tank-mixed with Prowl H₂O (4.2 – 8.4 pt/acre) for grass control
  - Only used on organic soils
- **Pendimethalin (4.2 – 8.4 pt/acre)**
  - Annual grasses
  - Tank-mixed with either atrazine or metribuzin
- **S-metolachlor + atrazine + mesotrione (3.0 qt/acre)**
  - Grasses and broadleaf weeds
- **Glyphosate (3.25 – 4 qt/acre)**
  - Only used before cane spiking
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<td>Auxin growth regulator</td>
<td>Phenoxyacetic acid</td>
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<td>Dicamba</td>
<td>Auxin growth regulator</td>
<td>Benzoic acid</td>
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Postemergence herbicides: broadleaves

• Triazines
  – Atrazine at 4 – 8 pt/acre – annual broadleaves
  – Metribuzin at 1 – 2 1/3 lb/acre – annual broadleaves, sometimes tank-mixed with atrazine
  – Evik (ametryn) at 0.5 – 1.5 lb/acre – small-seeded broadleaves, tank-mixed with atrazine. Mostly used at 0.25 lb/acre early in the season with cool temperatures

• Growth regulators
  – 2,4-D amine at 1 1/2 – 2 pt/acre and dicamba at 1 – 1 1/2 pt/acre – annual broadleaves including vines
  – Tank-mixed with other herbicides to broaden control

• Callisto (mesotrione) at 3 fl oz/acre
  – Annual broadleaves
  – Commonly applied in combination with atrazine (from 1 pt/acre)
Postemergence herbicides: broadleaves

- Newly registered herbicides
  - Armezon (topramezone) (1 – 2 fl oz/acre)
    - Annual broadleaf weeds
    - Can be tank-mixed with atrazine, metribuzin, or Evik
  - Lumax (3.0 pt/acre)
    - Annual broadleaf weeds
    - Can be tank-mixed with 2,4-D, metribuzin, or Armezon
## Postemergence herbicides: grasses & sedges

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<td>Carbamate</td>
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<td>Trifloxsulfuron</td>
<td>ALS inhibitor</td>
<td>Sulfonylurea</td>
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<td>ALS inhibitor Auxin growth regulator</td>
<td>Sulfonylurea Benzoic acid</td>
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Postemergence herbicides: grasses

- Triazines
  - Metribuzin at 1 – 2⅓ – very small grasses
  - Ametryn at 0.5 to 1.5 lb/acre – small grasses, tank-mixed with atrazine
- Asulox (asulam) at 6 – 8 pt/acre and Envoke (trifloxysulfuron) at 0.3 oz/acre
  - Annual grasses
  - Phytotoxicity occurs when applied under high temperature and moisture stress
  - Post-directed to minimize phytotoxicity
  - Tank-mixed to enhance grass control
- Armezon at 1 – 2 fl oz/acre
  - Annual and perennial (bermudagrass) grasses
  - Effective in providing acceptable control of newly established bermudagrass and suppression of established populations
  - Can be tank-mixed with atrazine, metribuzin, Lumax, and Asulox to enhance grass control
Postemergence herbicides: sedges

• Sandea (halosulfuron) at \(\frac{3}{4} - 1\frac{1}{3}\) oz/acre and Envoke at 0.3 oz/acre
  – Halosulfuron is the most effective
  – Control programs are first implemented during the sugarcane fallow period using glyphosate to reduce tuber populations that reinfest subsequent plant cane

• Yukon (halosulfuron + dicamba) at 4 to 8 oz/acre
  – Nutsedge and broadleaf weed control
What constitutes an effective weed management program?

- Correct weed identification
- Selection of proper control measure(s)
- Using an integrated approach
- Correct implementation of a control program