Weed control and herbicides used in Florida sugarcane

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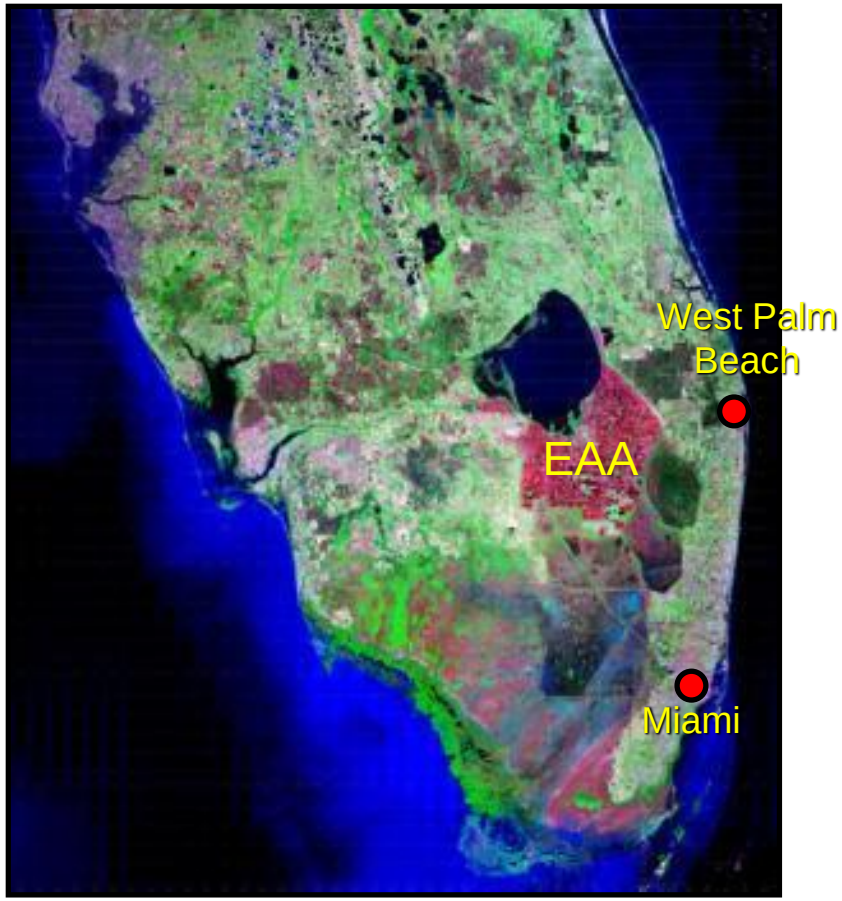
Sugarcane production in Florida

- 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%
    - 1st ratoon (29.5%), 2nd ratoon (29.1%), 3rd ratoon (9.8%), 4th 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

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Weeds in Florida sugarcane

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

Herbicide	MOA	Chemical family	Group
Atrazine	Photosystem II inhibitor	*s*-triazine	5
Metribuzin	Photosystem II inhibitor	*as*-triazine	5
Pendimethalin	Microtubule inhibitor	Dinitroaniline	3
S-metolachlor + Atrazine + Mesotrione	Long-chain fatty acid Photosystem II inhibitor HPPD inhibitor	Chloroacetamide *s*-triazine Triketone	15 5 27
Mesotrione	HPPD inhibitor	Triketone	27
Clomazone	Diterpene synthesis inhibitor	Isoxazolidinone	13
Diuron	Photosystem II inhibitor	Phenylurea	7
Glyphosate	EPSP synthase inhibitor	Organophosphorus	9

Most commonly used PRE herbicides

- Atrazine (4 – 8 pt/acre)
  - Broadleaf weeds
  - Tank-mixed with Prowl H_2O (4.2 – 8.4 pt/acre) for grass control
- Metribuzin (1 - 2⅓ lb/acre)
  - Broadleaf weeds and some grasses
  - Tank-mixed with Prowl H_2O (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

Postemergence herbicides: broadleaves

Herbicide	MOA	Chemical family	Group
Atrazine	Photosystem II inhibitor	*s*-triazine	5
Metribuzin	Photosystem II inhibitor	*as*-triazine	5
Ametryn	Photosystem II inhibitor	*s*-triazine	5
S-metolachlor + Atrazine + Mesotrione	Long-chain fatty acid Photosystem II inhibitor HPPD inhibitor	Chloroacetamide *s*-triazine Triketone	15 5 27
Mesotrione	HPPD inhibitor	Triketone	27
2,4-D amine	Auxin growth regulator	Phenoxyacetic acid	4
Dicamba	Auxin growth regulator	Benzoic acid	4
Topramezone	HPPD inhibitor	Pyrazolone	27

Postemergence herbicides: broadleaves

- Triazines
  - Atrazine at 4 – 8 pt/acre – annual broadleaves
  - Metribuzin at 1 – 2 ⅓ 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 1½ – 2 pt/acre and dicamba at 1 – 1½ 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

Herbicide	MOA	Chemical family	Group
Atrazine	Photosystem II inhibitor	*s*-triazine	5
Metribuzin	Photosystem II inhibitor	*as*-triazine	5
Ametryn	Photosystem II inhibitor	*s*-triazine	5
S-metolachlor + Atrazine + Mesotrione	Long-chain fatty acid Photosystem II inhibitor HPPD inhibitor	Chloroacetamide *s*-triazine Triketone	15 5 27
Asulam	DHP inhibitor	Carbamate	18
Topramezone	HPPD inhibitor	Pyrazolone	27
Trifloxysulfuron	ALS inhibitor	Sulfonylurea	2
Halosulfuron	ALS inhibitor	Sulfonylurea	2
Halosulfuron + Dicamba	ALS inhibitor Auxin growth regulator	Sulfonylurea Benzoic acid	2 4

Postemergence herbicides: grasses

- Triazines
  - Metribuzin at 1 – 2⅔ – 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 ¾ - 1⅓ 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

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