IPM for selected Florida weeds

Florida’s environment

How invaders get here...
And how they spread

IPM: Integrated Pest Management
All the tools in the toolbox
- Cultural
- Mechanical
- Biological
- Chemical

What to do???
Keep ‘em out!!

Growing requirements/cultural conditions
Natural enemies

Biological control requirements

Host-specific
Self-sustaining

Overseas Search
Quarantine
Petition for Release
Release
Evaluate
Implement

Basic Insect and Plant Research.
Biological Control Pipeline

Herbicides

Crop: 200+
ROW/NA: not as many
Aquatic: 17 a.i.

Act on plant processes
Auxins/hormones
Photosynthesis
AA/protein production
Cell integrity
**Synthetic auxins (3)**

Auxins = plant hormones
- Synthetics mimic naturally occurring auxins
- Abnormal growth
- Twisting, curling

2,4-D, triclopyr, florpyrauxifen-benzyl

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**Photosynthesis inhibitors (2)**

Photosynthesis – food production
- Complex process: \( \text{CO}_2 + \text{H}_2\text{O} + \text{sun} \rightarrow \text{sugars} \)
- Direct interference

Diquat, copper

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**Enzyme inhibitors (6 enzymes, 10 total)**

Enzymes regulate plant processes
- Low toxicity to critters

ALS:
- Imazamox, imazapyr, penoxsulam, kopyntac

EPSPS:
- glyphosate

PPO (protox): carfentrazone, flume

HPPD:
- topramezone

PDS:
- fluridone

ACCase:
- sethoxydim
Membrane disruptors (2)

Cell membranes regulate movement in cells
Leaky – improper cell function
Endothall (AA – algae, K salt – submersed)
Hydrogen peroxide

IPM toolbox

Cultural
Mechanical
Biological
Chemical

Some of Florida’s aquatic weeds
Waterhyacinth

1880s

Waterhyacinth

*Eichhornia (Pontederia) crassipes*
Brazil, S. America
Florida Prohibited Aquatic Plant

Plant height to 3'
Leaves 5”, round
Leathery/rubbery
Spongy petioles; basal
Roots dark, feathery
Showy purple flowers
**Waterhyacinth**

**Alligatorweed**

**Alternanthera philoxeroides**
S. America
FL Prohibited Aquatic Plant

Plant height to 1’
Leaves simple, to 4”
Elliptic to lanceolate
Smooth margins
Opposite
Hollow stems
White flower on peduncle
**Hydrilla**

*Hydrilla verticillata*

Multiple origins – Korea, India* (FL: dioecious ♀)

Federal Noxious Weed

Plant height to 25’

Leaves strap-shaped, 0.5”

Coarse serrations

Verticillate (4 to 8)

Rooted; tubers, turions

White flower to 0.25”; long peduncle
Floatinghearts

1990s

Crested: *Nymphoides cristata*; yellow: *N. peltata*
Asia; Florida Noxious Weeds

Leaves 5-6", smooth
CFH: Cordate, red markings
YFH: Round, ruffled
Small flowers
CFH: Rridged, white
YFH: Papery margin, yellow
CFH: Spikey ramet
YFH: Seeds

Crested floatingheart
**Rotala**

*Rotala rotundifolia*

Asia

FLEPPC Category 2

Plant height to 8”/16’
Leaves simple, smooth margins, opposite or whorled
  - Emergent round, to 0.5”
  - Submersed elliptic, to 1”
Bright red to green stems
Spike of bright pink flowers
Some of Florida’s upland weeds

Brazillian pepper

Schinus terebinthifolius
Argentina, Paraguay, Brazil
FL Noxious Weed

Plant height to 30’
Leaves compound
3-13 oblong leaflets 2”
Serrate; red midrib
Alternate
White flowers, red berries
Melaleuca quinquenervia
Australia
Florida Noxious Weed
Wet feet, high and dry
Leaves simple, elliptic
Smooth margins
Alternate arrangement
Tree with papery bark
White bottlebrush flowers
Air potato

*Dioscorea bulbifera*
Asia
FL Noxious Weed

Herbaceous vine to 70'
Leaves simple, cordate
Smooth margins
All veins arise from leaf base
Alternate arrangement
Aerial bulbils
Air potato

Climbing ferns

1930s (J), 1950s (OW)

Lygodium japonicum, L. microphyllum
- Japanese: E Asia, E Indies, Australia 1930s
- Old World: Africa, Asia, Australia 1950s
Both: FL Noxious Weeds; OWCF: Federal
Plant height to 100'
Stems underground
Fronds compound
- Multiple opposite pinnae
- Twining rachis
Spores
Downy rosemyrtle

1920s

**Rhodomyrtus tomentosa**
Asia, India, Philippines
Fl. Noxious Weed
Plant height to 10'
Leaves simple, 3”
Elliptic, smooth margins
Marginal vein
Opposite
Showy pink/fuchsia flowers
Dark purple fruit
Importance as vectors

- Waterhyacinth
- Hydrilla
- Crested floatingheart
- Yellow floatingheart
- Rotala
- Brazilian pepper
- Melaleuca
- Air potato
- Japanese climbing fern
- Downy rosemyrtle

Take home message

- Lots of weeds – water and land
- Keep ‘em out!!!
- Some tools, never enough
- Use IPM whenever possible
- Try new things!
- Safety first!!!

Downy rosemyrtle
Thanks!

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