Invasive Grasses of Florida
Biology and Management

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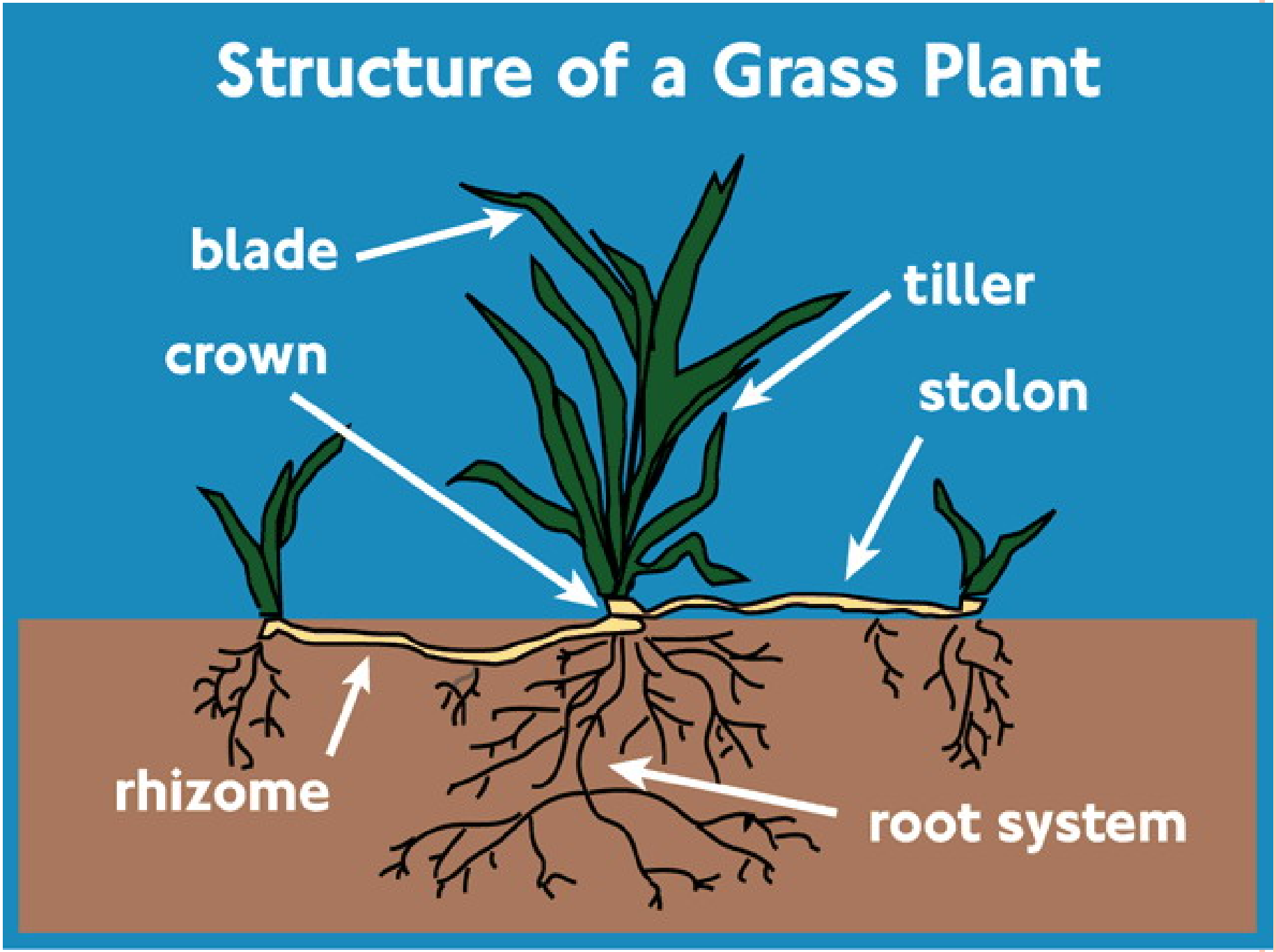
Types of Grasses

- Perennial or Annual
- Bunch or Spreading
- Stolons or Rhizomes
- Viable Seeds or Not-so Viable?

Structure of a Grass Plant



Management Strategies

Key Steps:

1) identification
2) control procedure/method*
   level of infestation
   location/ecosystem
3) monitor regrowth or reinfestation

Methods of Management

- Prevention
- Cultural
- Biological
- Mechanical
- Chemical – Herbicide Selection
  - Rate, Timing, Application Type
  - Glyphosate, Imazapyr, etc.

Biological Control

- Selectivity is the big issue


Cogongrass

COGONGRASS

- Native to southeast Asia
- Highly adapted to poor soils, drought, pyrogenic ecosystems
- Extensive rhizome system
- Successful/persistent in low light environments

Preventative and Cultural

- Spread primarily from rhizomes on equipment & fill dirt
- Seed spread is becoming a major issue
  - Maintain a good cover

Mechanical

Deep plow or disk several times during the dry season, cut to a depth of at least 6 inches; this ensures most rhizomes have been cut

Herbicides

Imazapyr (Arsenal, etc.)

- Use high rates – 1.5 to 4 pints/A (0.5 to 1% solution)
- Non-crop areas such as rights-of-way and fence rows
- Treated areas will be bare for 6 months to a year
- Be wary of off-target damage

Glyphosate (Roundup, etc.)

- Use high rates 3-4 qt/A (2-4% solution)
- Multiple applications are needed
- No residual soil activity

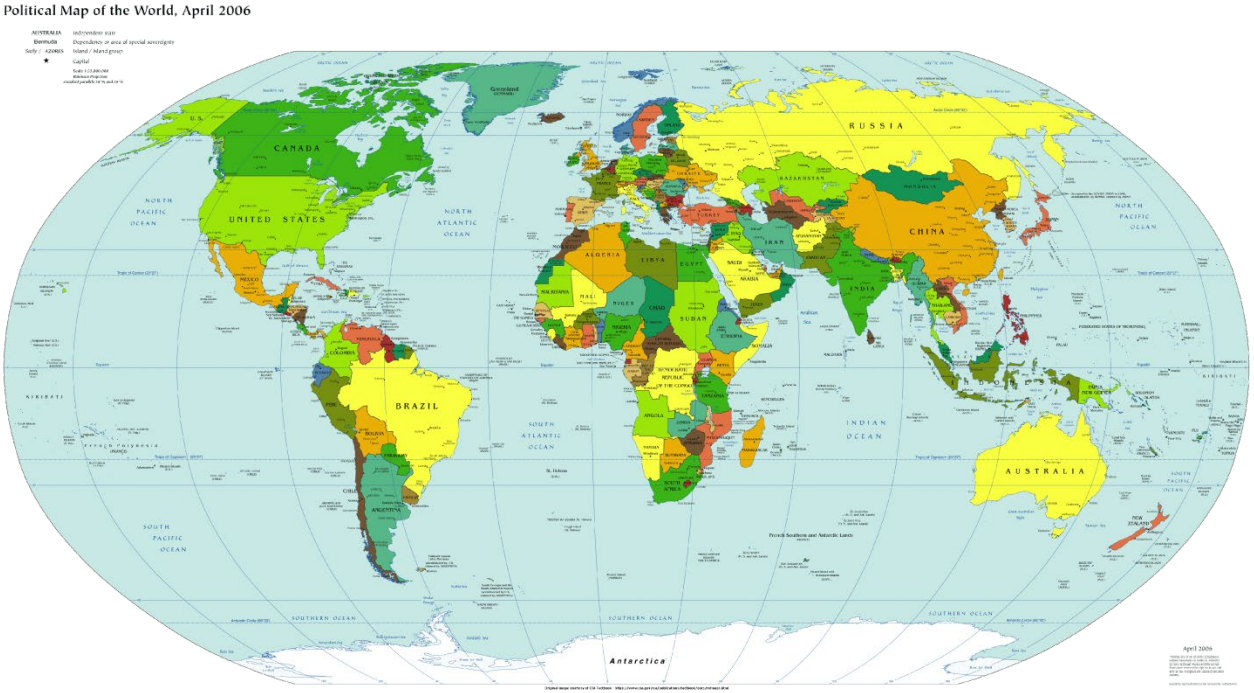
A WORD ABOUT SEEDS

- Originally thought to be all one clone
- Increasing reports of seed vectored populations
- Good? News – poor seedling vigor and short viability period… < one year

Varieties of Cogongrass?

- Var. major
- Var. europa
- Var. africana
- Var. condensata
- Var. latifolia
- *Imperata brasiliensis* – Brazilian satintail

Var. rubra

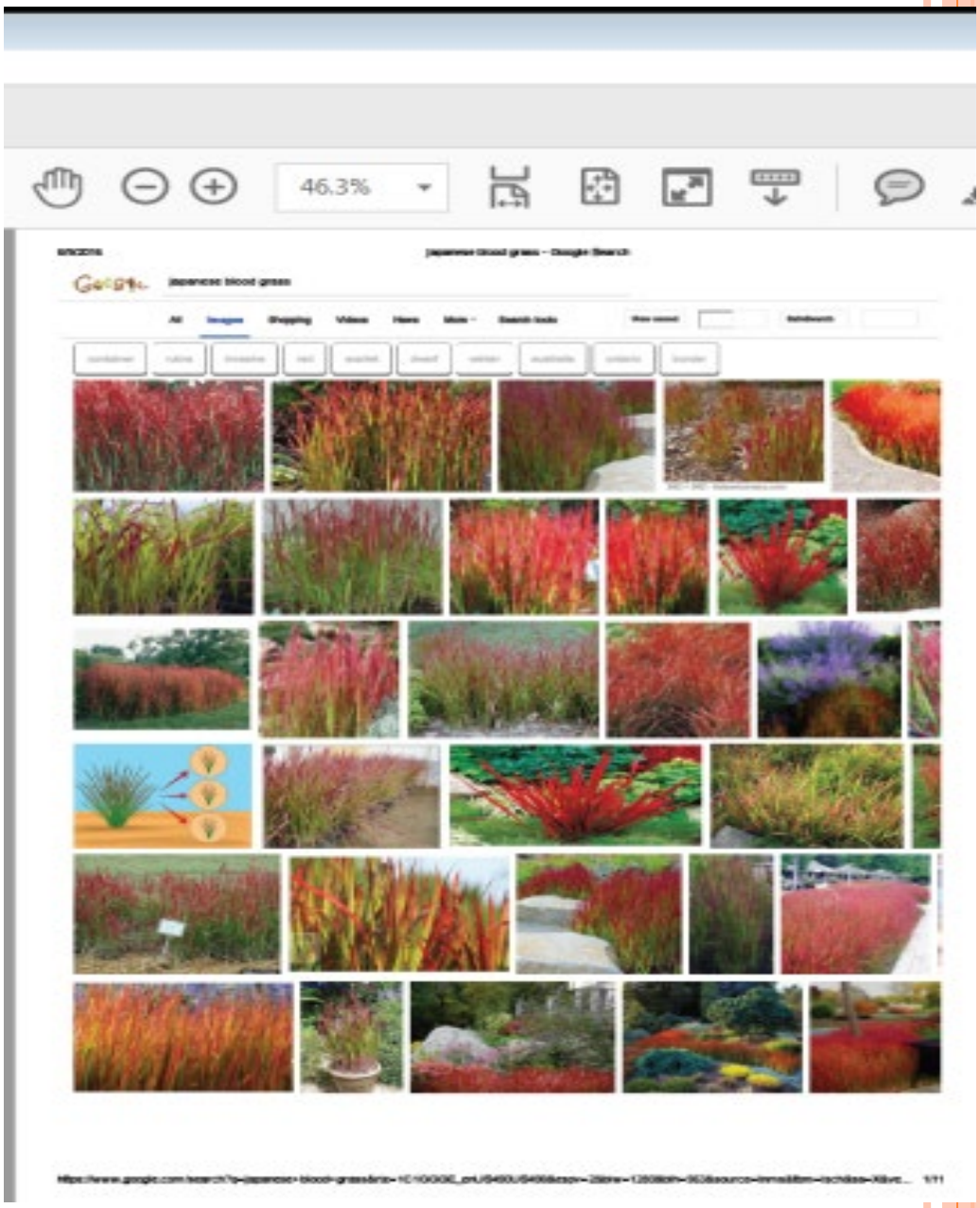


‘Rubra’

- Will revert to the normal green biotype
- Conflicting reports on aggressiveness
- Appears to be cold-tolerant
- Genetically related to *Imperata brasiliensis*??

VAR. 'RUBRA'

- Red variety of cogongrass
- Sold widely in the ornamental trade
- Red Baron, Japanese Blood Grass



ARE WE IN TROUBLE?

Pollen from Red Baron population growing in a garden in Maryland

Wild cogongrass growing in Alachua County, Florida

Produced a viable cross between the 2 populations that appears to be genetically distinct

Where do we go from here?

- Seed viability and spread by seeds is concerning and could pose big issues
  - Population shifts
  - More rapid expansion
  - Resistance

Questions Arise….

- Although some work has been conducted on population dynamics, there is *confusion and conflicting data*
- Several reports of non-viability, but is this accurate????
- How much diversity exists and to what level is cogongrass diversifying?

Torpedograss

- Native to Africa and or Asia
- Introduced into Florida in late 1800's as a wetland forage grass
- Perennial, spreads through stolons and rhizomes
- Named for sharply pointed or 'torpedo-like' growing tips

Mature Plant

- Perennial grass, roots on shore and will extend several feet out into shallow water
- Will grow up thru the water column
- Forms dense monoculture along shoreline of lakes and ponds

Preventative

- Limit planting as a forage
- Remove existing plants, including stolons and rhizomes
- Cattle grazing will often keep in check, but to a limited extent

Mechanical

Small infestations can be removed with repeated, aggressive tillage

- Limited to non-flooded sites

Burning effective in removing above ground biomass, may enhance chemical control measures

Chemical

1. Broadcast applications for large areas
   - ✓ Glyphosate at 2 to 4 lbs-ai/A
   - ✓ Imazapyr at 0.5 to 1.0 lbs-ai/A
2. Spot treatment for smaller areas
   - ✓ Glyphosate – 2 to 3% solution
   - ✓ Imazapyr – 0.5 to 1% solution
3. Use surfactant at 0.25%
4. *Adhere to irrigation restrictions for imazapyr, may cause off-target damage*

Paragrass

- Semi-aquatic grass
- Stolons only
- 3 ft tall erect; up to 15 ft long
- Prefers water fluctuations

- Leaf sheath - dense stiff hairs
- Leaf flat 0.5 wide and 10-12 in. long
- Hairy and swollen nodes

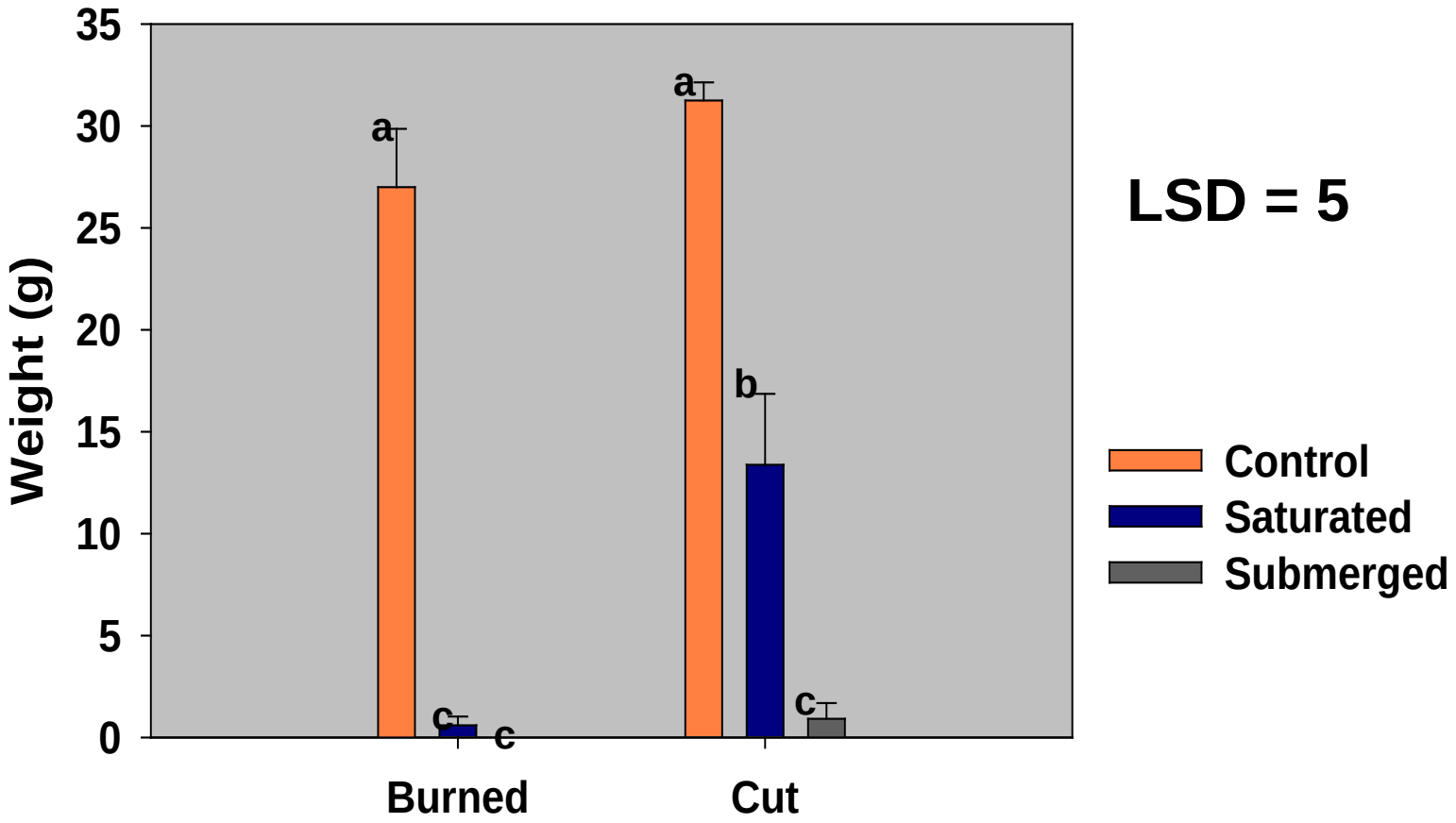
Terminal spike flower - 8 in. long with branches
Often purple-tinged

Seed produced but low germination

Herbicides

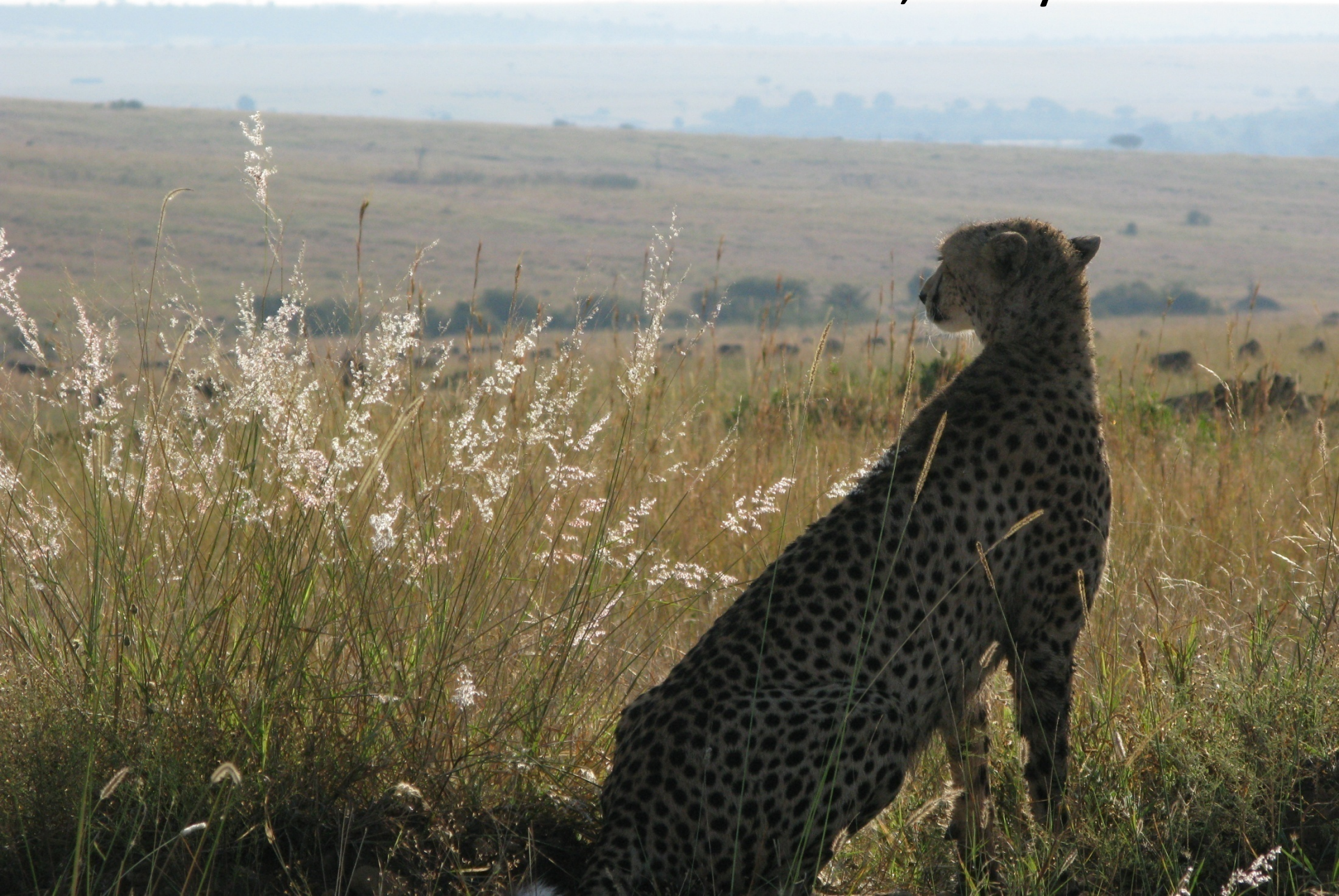
- 6 pint/acre glyphosate
  - Best if applied to lush growth; may require burning and treating new regrowth
  - Will have to retreat escapes
- 2 to 4 pint/acre imazapyr
  - Use higher rate for long-established stands
  - Expect quicker recovery of native species when water standing

Effect of water treatments on Paragrass stolon dry weight after burning or cutting




Natalgrass

Masai Mara National Reserve, Kenya



Natalgrass

- Dry upland sites, disturbed areas
- Annual grass
- Bunch-type
  - No stolons
  - No rhizomes
- 2-4 feet tall

Leaves linear

8 to 12 in long

Flowers pink-purple, covered with reddish hairs, turning gray/silver with age

Seeds extremely viable, wind-dispersed – major mechanism of spread

Herbicides

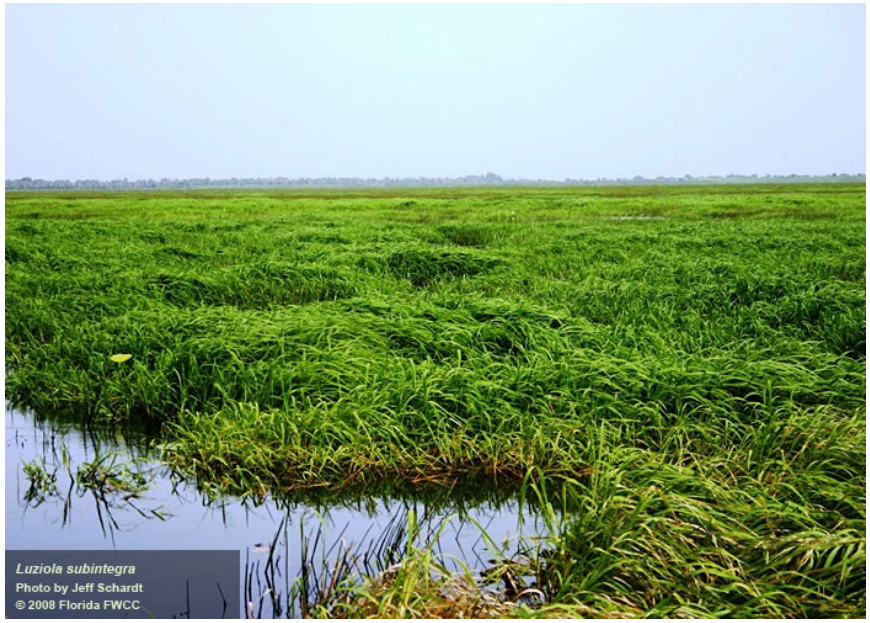
- Glyphosate very effective – 1.5 to 3 qts/A
- Imazapyr provides good control – 1-2 pints/A
- Imazapic provides suppression but good tolerance to native plants
- Key is prevention of reinfestion from seed

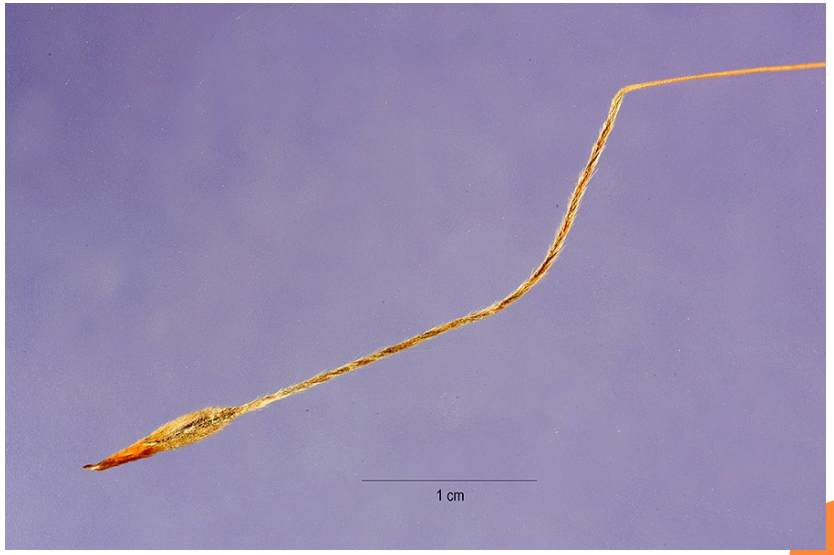
New 'Old' Problems

- Bamboo – running and clumping types
- Elephantgrass
- Arundo
- Burma-reed
- Phragmities
- others?

New Problems?

- Luziola - Tropical American water grass
- Sweet tanglehead
- Energy grasses?





Terms of Endurement?

- Harm
- Damage
- Injury
- Impairment
- Destruction
- Loss

** Exotic species invasions mean different things to different clientele*

Potential Strategies

- ✓Start on perimeter and work inwards
- ✓Start in one area and work outwards
- ✓Most invasive to least invasive
  - ✓Coverage – area infested
  - ✓Rapidity of spread
- ✓Most easily controlled vs. difficult
- ✓Ecologically sensitive areas first
- ✓Funding potential and demonstrate impact

Overall Goals

1) determine threshold levels that would constitute control (current or predicted)
2) determine the effectiveness of control methods and frequency to maintain thresholds
3) developing a framework to construct integrated management plans

Presentation will focus on grasses

“Maintenance Control”

How do you define (parameters) maintenance control?

- impact – functional
- impact – diversity, ecological
- cost – loss of services
- cost – control measures

Ultimately cost vs. impact

Water Hyacinth

- Best example of ‘maintenance control strategy’
- Keep the levels low….
- Why does it work well?
  – We know reproductive capacity, vegetative
  -- effective control options
  -- easily detected, sprayed

Types of Grasses

- Annual, short lived perennials
- Clumping, moderate perennials
- Rhizomatous perennial, long-term
- Aquatic perennials, rhizomes and/or seed spread

Natalgrass

- Easily controlled…. But often the first species back into the open area
- Seeds germinate in mid-late spring(>20C)
- Control early before seed-set ~100%
- Has been shown to transition out on its own – natural succession

Guineagrass

- Tropical forage grass, common in Florida
- Perenniates from large clumps
- Flowering – short day event?
- Prolific seed producer
  - Seeds are dormant initially but last about 3-4 years


Photo - Werner Stur ©

Guineagrass

- Control dependent on clump size and age
  - 1 to 2 applications prior to flowering
  - Selective removal of seedlings for the next 3-4 years, use a pre herbicide?
  - Scout downwind or traffic patterns for spread
  - Likely not to establish once restored

Cogongrass

- Difficult to control – multiple applications of highly unselective herbicides
- Results in completely bare ground areas
- Restoration difficult and need to make sure cogongrass has been eliminated

Torpeodgrass

- Difficult to control – multiple applications of highly unselective herbicides
- Results in all or nothing situation
- Restoration difficult and need to make sure torpedograss has been eliminated

Developing a Plan

- Natalgrass
  - treat early in spring
  - monitor for escapes within 2-3 weeks
  - allow native species to recolonize
  - seed source nearby, watch for issues in disturbed open areas
  - Possible selective control options
- KEY is prevention of flowering and seed

Developing a Plan

- Guineagrass
  - Treat early summer, prior to flowering
  - Within 1-2 months monitor regrowth - retreat
  - Revisit area for 3-4 years for re-infestation from seed
  - Possible pre-emergence selective control options
- KEY is prevention of flowering and seed

Developing a Plan

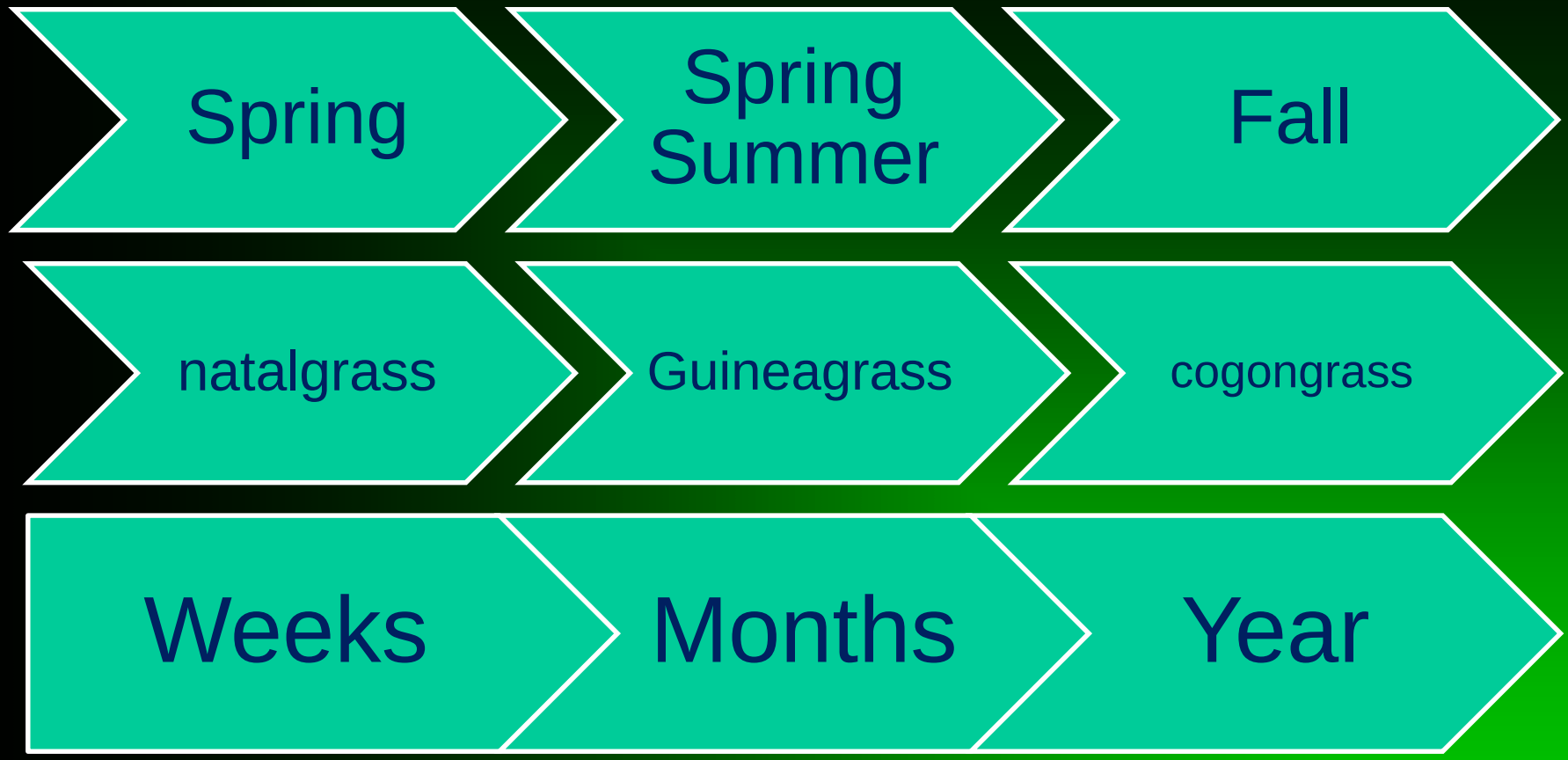
- Cogongrass
  - Treat early fall prior to frost
  - Within 1 year monitor regrowth - retreat
  - Revisit area for 2-3 years for re-infestation

- KEY is complete removal of rhizome biomass prior to allowing native species recolonization

Developing a Plan

- Torpedograss
  - Treat on dryland whenever possible
  - Monitor regrowth – retreat when runners reach 2-3 feet of new growth
  - Revisit area for 2-3 years for re-infestation
- KEY is complete removal of rhizome biomass prior to allowing native species recolonization

Timeline


Spring
Spring
Summer
Fall
natalgrass
Guineagrass
cogongrass
Weeks
Months
Year

Predicted control for aquatic grasses 9 to 12 months after treatment

Grass	Glyphosate Dry land	Gly + Imaz Dry land	Imazapyr Dry land	Glyphosate Flooded	Gly + Imaz Flooded	Imazapyr Flooded
Torpedograss	80	87	90	20	40	55
West Indian marshgrass	90	95	95	30	45	60
Tropical American watergrass	90	95	95	30	45	60
Limpograss	90	95	95	30	45	60
Paragrass	85	93	95	25	45	60

Predicted control and retreatment interval in months for upland grasses

Grass	Glyphosate Control	Imazapyr Control	Glyphosate retreatment	Imazapyr retreatment
Bermudagrass	80	90	6-12	8-12
Cogongrass	80	90	6-12	8-12
Burmareed	80	90	6	8
Golden bamboo	75	85	2-4	3-6
Elephantgrass	80	90	6-12	8-12
Green fountaingrass	95	95	2-4	4-6
Missiongrass	95	95	2-4	4-6
Pampasgrass	90	95	2-4	4-6
Guineagrass	95	95	2-4	4-6