



***WEED RESISTANCE IN LOUISIANA  
COTTON PRODUCTION REGIONS –  
MANAGEMENT STRATEGIES***

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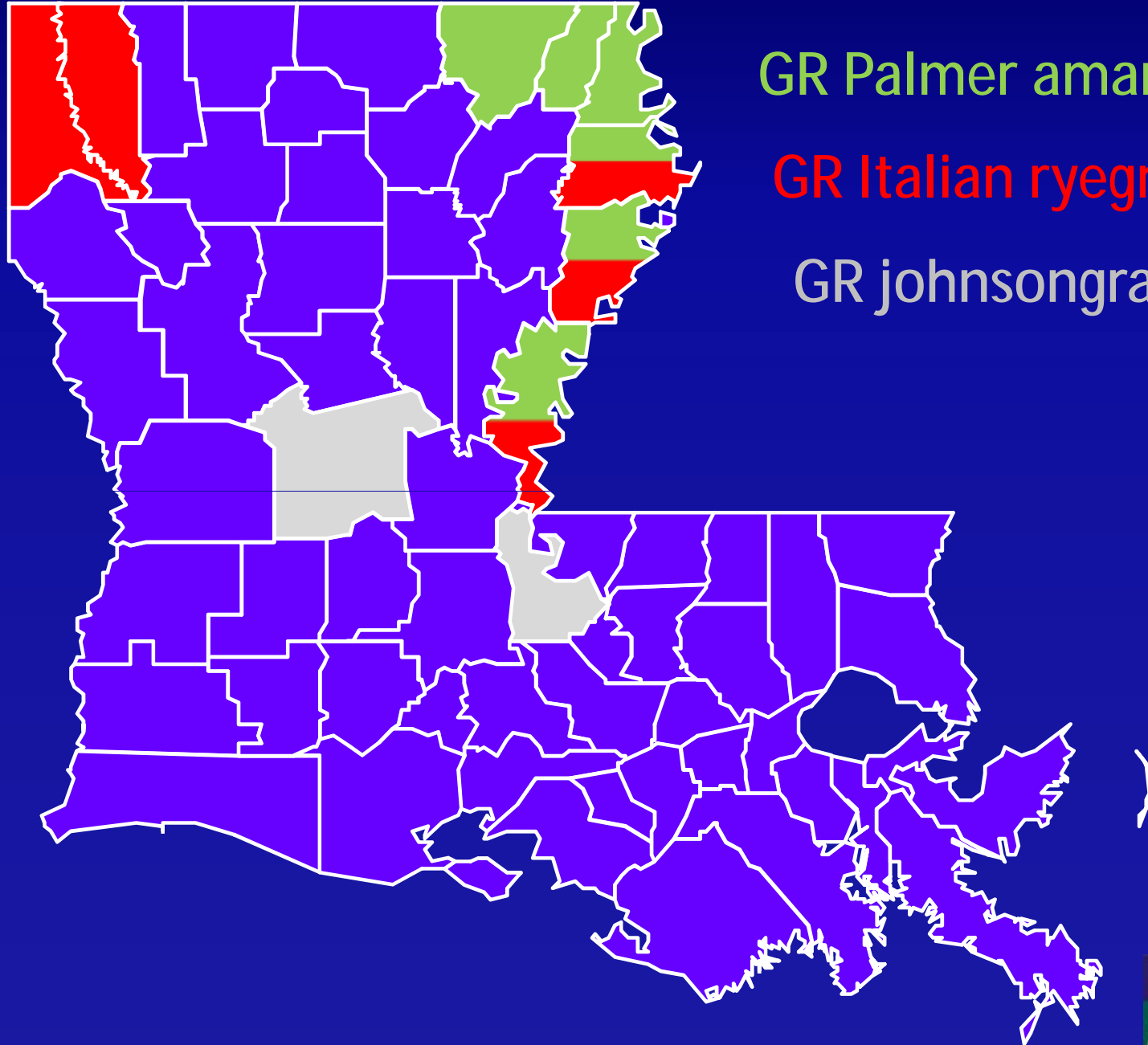
# Many, many weeds!



# Weeds are relentless!



Photo: Dr. Jason A. Bond – Miss. State Univ.



GR Palmer amaranth

GR Italian ryegrass

GR johnsongrass



# Palmer amaranth



Photo: Dr. Jason A. Bond – Miss. State Univ.

# Palmer amaranth

- Life cycle: Summer annual
- Reproduction: Dioecious, self-pollinator
- Photosynthesis:  $C_4$
- Seed production: 200,000 seeds/plant with 73% germination
- Growth rate: 0.21



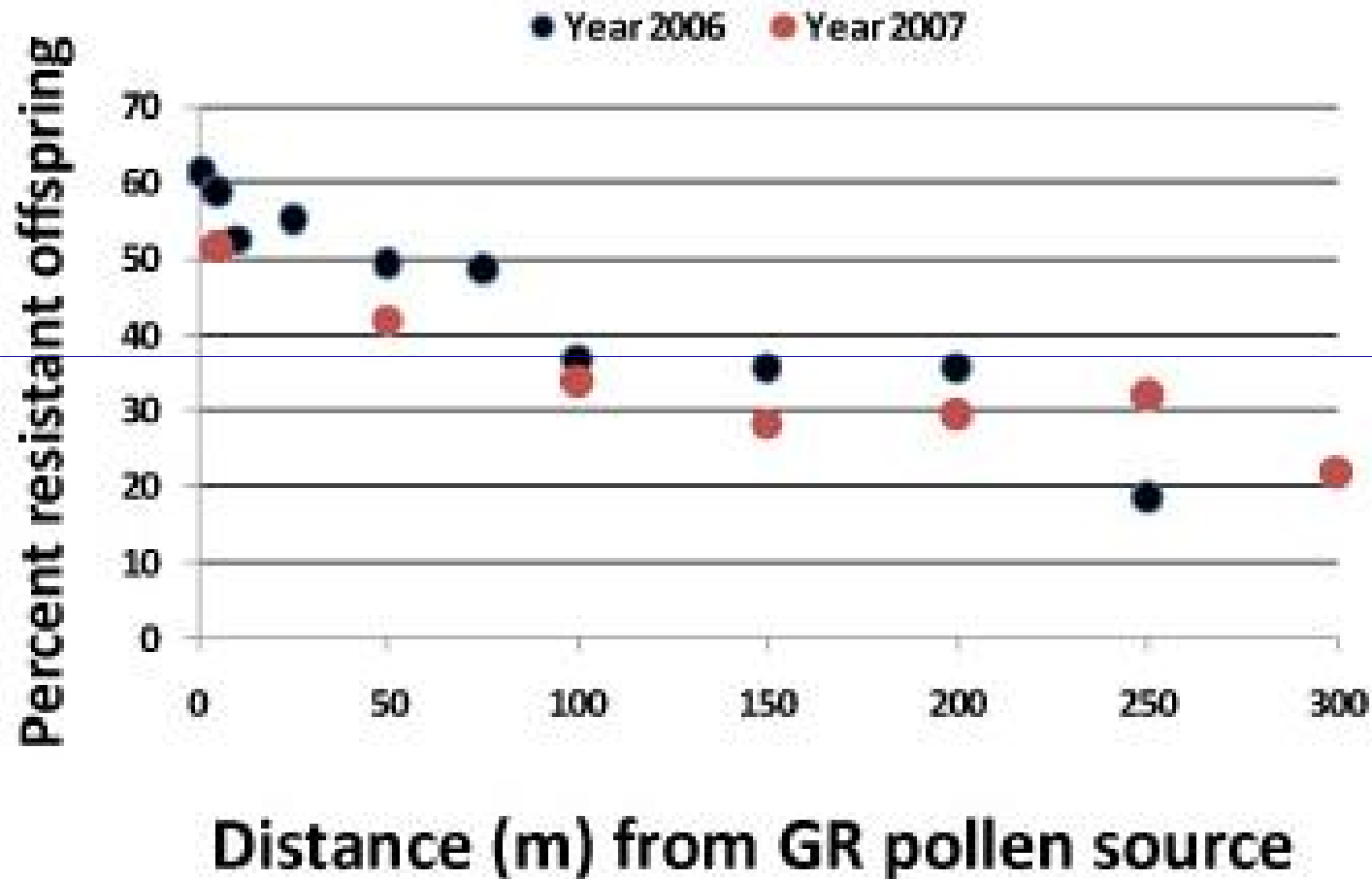
SS- Aug. 21<sup>st</sup>

seed/plant

Aug. 15<sup>th</sup>

Sources: Mosyakin and Robertson 2008; Ehleringer 1983; Gallagher and Cardina 1997; Keeley et al. 1987; Horak and Loughlin 2000

# Resistance gene will move!





# Tillage





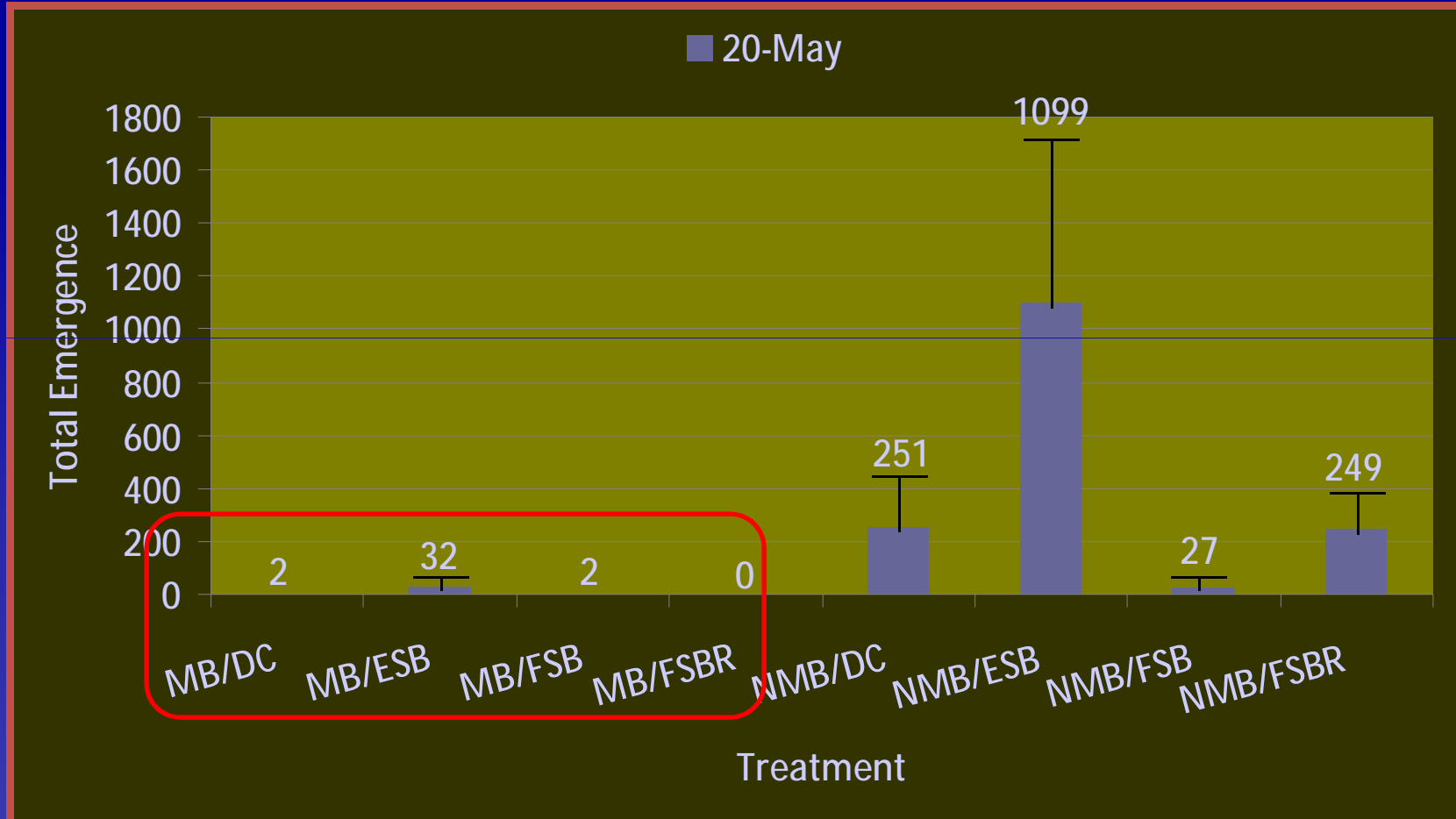
# Tillage

## Three weaknesses of Palmer amaranth

- Light requirement for germination
- Shallow emergence depth
  - 36 to 44% emergence at burial depth of 0 to 1 in
  - 7% emergence at burial depth of 2 in
- Short seed life in soil
  - Germination reduced 50% after burial for 18 months

Source: Keely et al. 1987; A.S. Culpepper, Univ. Georgia

# Results





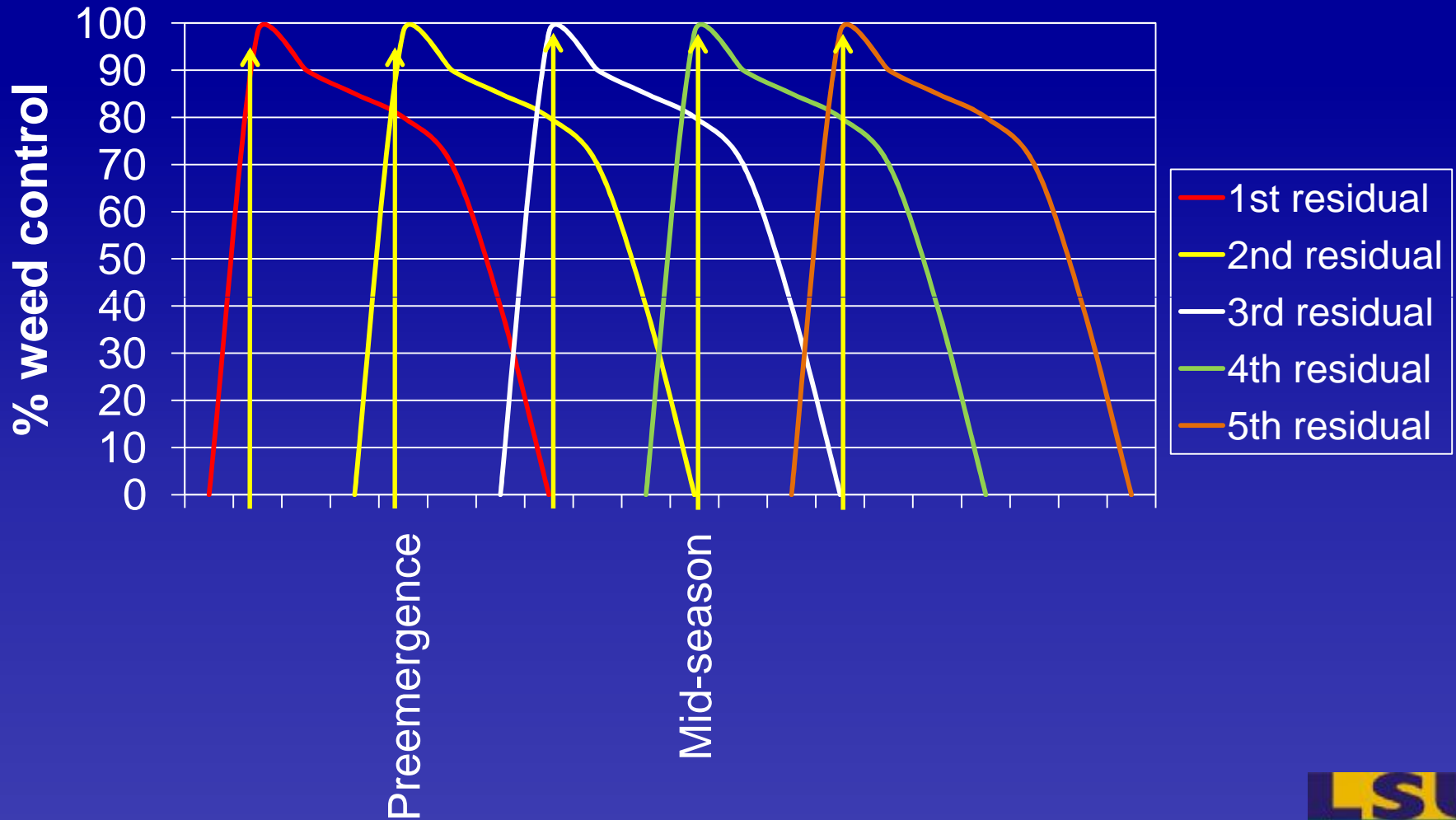
# Tillage

- Deep tillage works
- Hipping-rows following deep tillage
  - Negates any advantage
- Deep tillage and plant flat!



# Residual herbicides in cotton

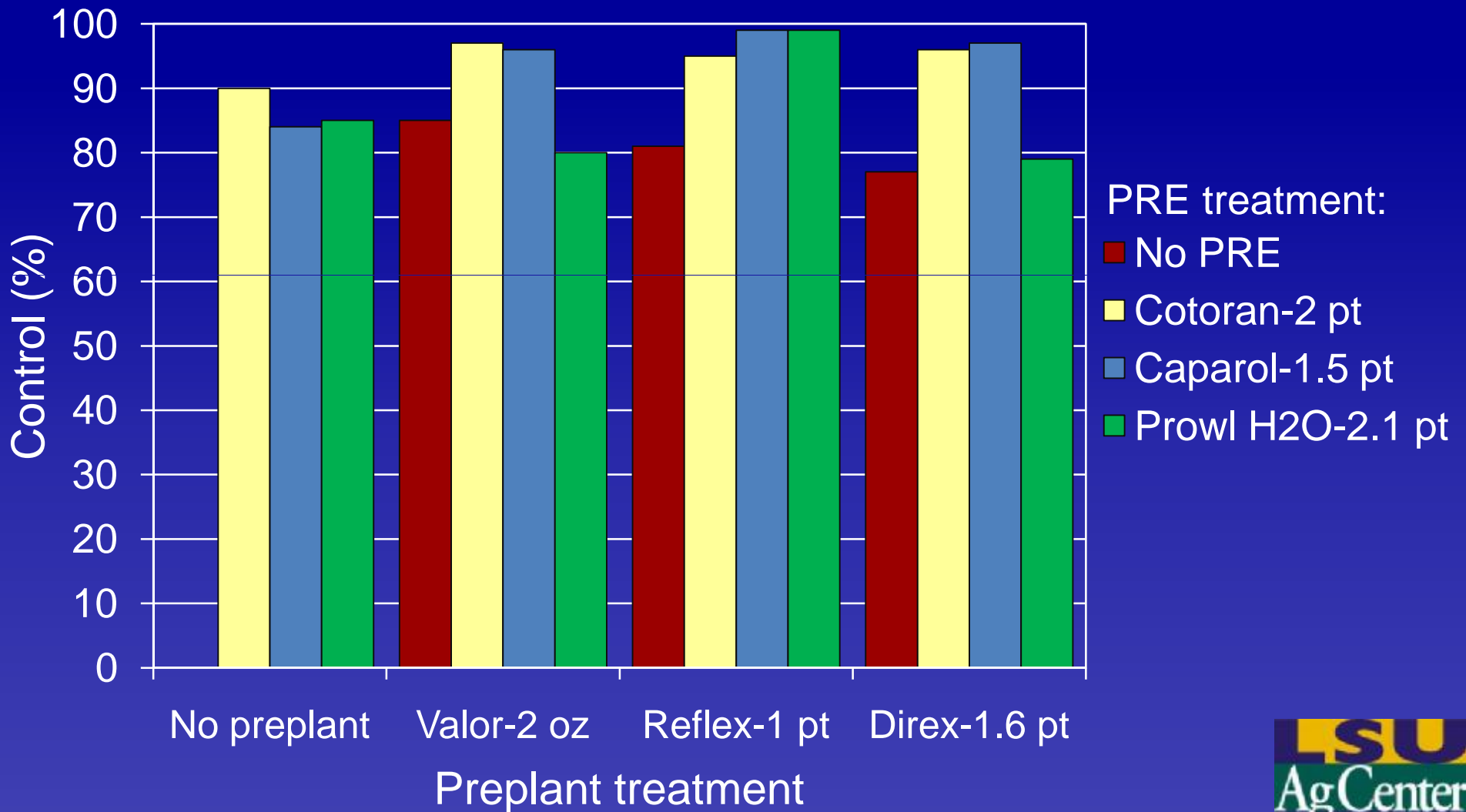
## Overlay residual herbicides





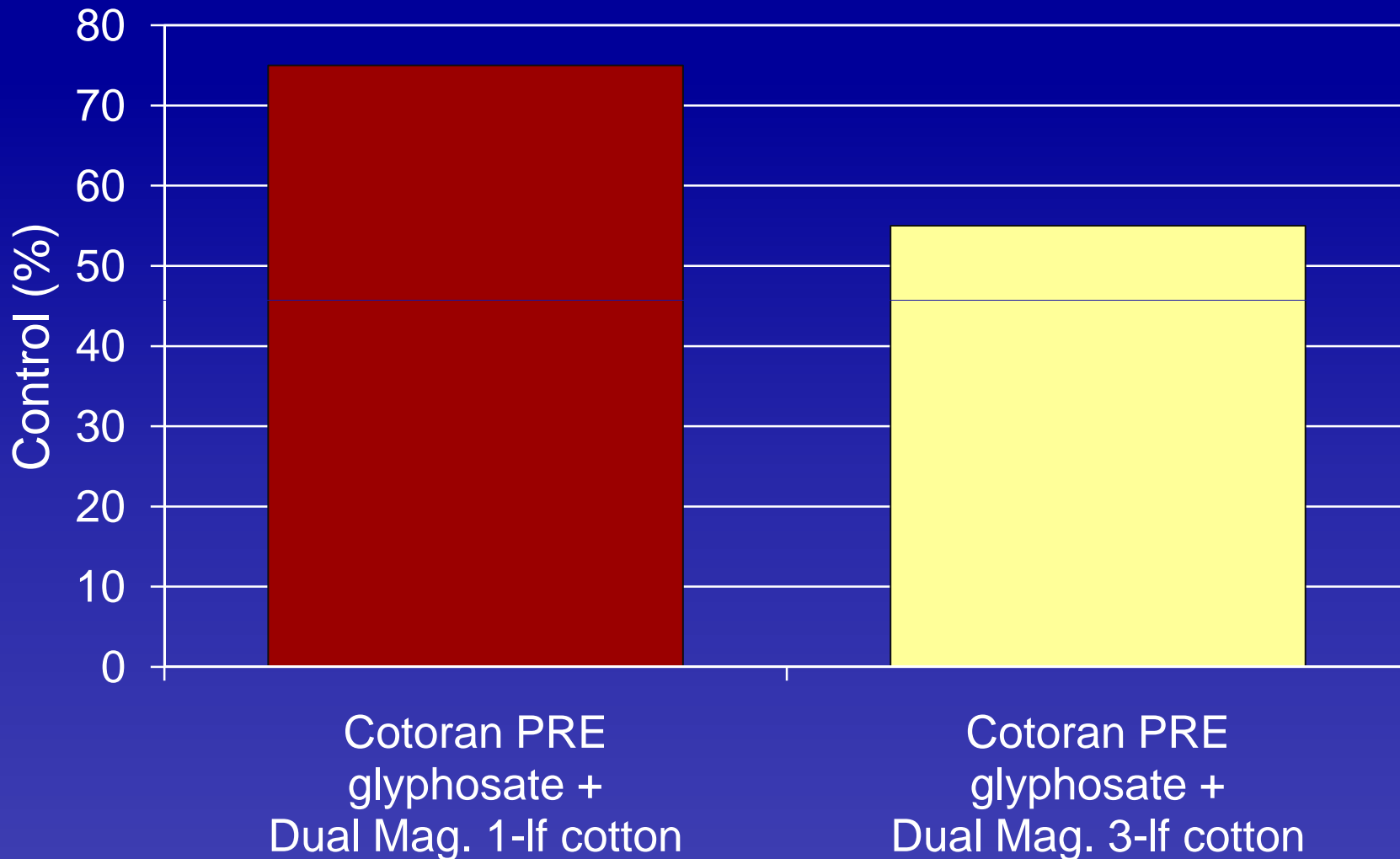
# Residual Programs in Cotton

## Palmer Amaranth Control 4 Weeks After Planting



# Residual Programs in Cotton

Palmer Amaranth Control 4 Wk After Planting in Mississippi



Data provided by Dr. Jason A. Bond – Miss. State Univ.



# Residual Programs in Cotton



Nontreated



Valor – 2 OZ/A



Reflex – 1 PT/A



Direx – 1.5 PT/A

# Liberty Link Cotton



**Ignite 29 OZ/A fb Ignite 29 OZ/A**



**Cotoran at 1.5 PT/A PRE  
Ignite 29 OZ/A fb Ignite 29 OZ/A**

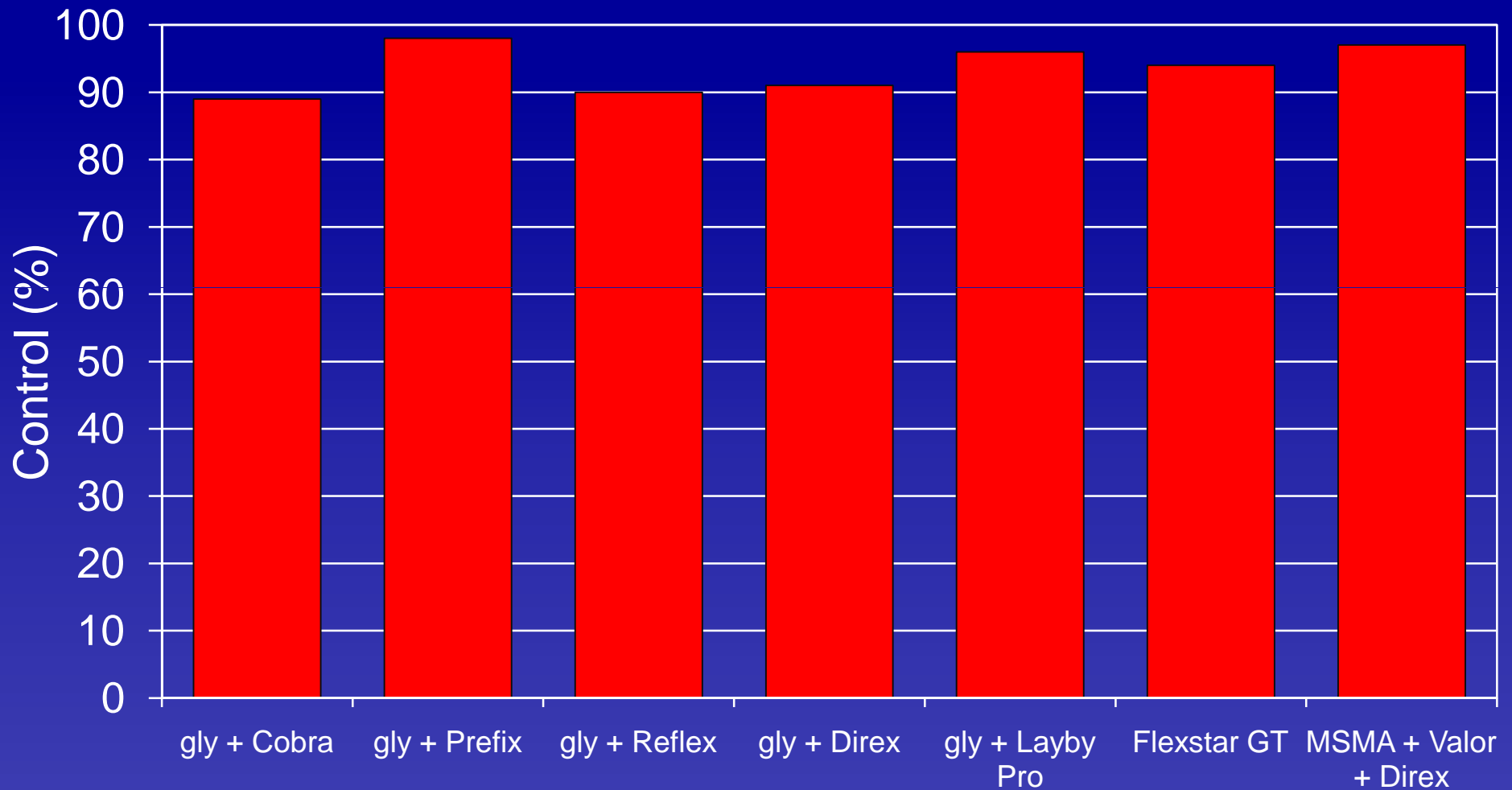
- Start clean
- Apply residual herbicides preplant/preemergence
- **TIMING!!**
- $\leq 10$  days between applications
- Tank-mix Dual Magnum with Ignite
- Utilize residual herbicide at layby timing
- Correct application





# Layby Herbicides in Cotton

Palmer Amaranth Control 2 Weeks After Layby



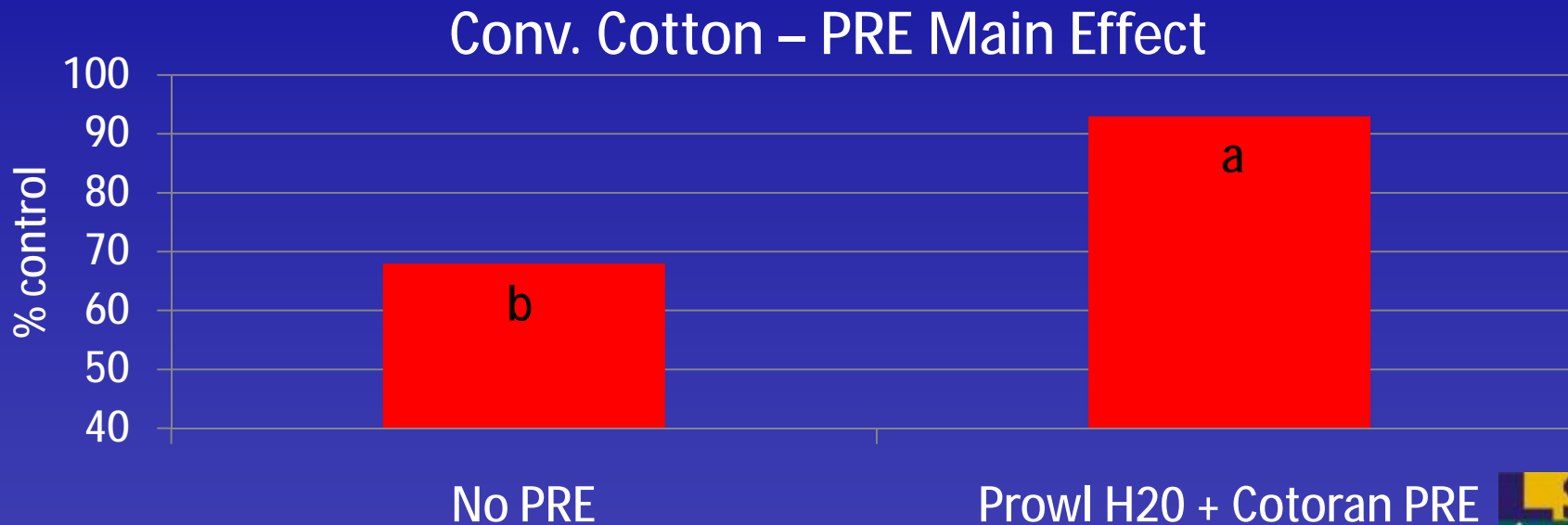
# Conventional vs. RRF vs. LL

- Non-RRF, non-LL cotton – conventional herbicide program
- Roundup Ready Flex cotton – glyphosate + other herbicides
- Liberty Link cotton – Liberty + other herbicides

- Prowl H<sub>2</sub>O @ 1 qt/A
- Cotoran @ 1 qt/A
- Staple LX @ 2 oz/A
- Envoke @ 0.1 oz/A
- Dual Magnum @ 1 pt/A
- Direx @ 1.5 pt/A
- Valor SX @ 2 oz/A
- MSMA @ 2 lb/A
- Glyphosate @ 1 lb/A
- Liberty @ 29 oz/A

PRE	EPOST (2-3 lf)	MPOST (6-8 lf)	Layby (10-12 lf)
None	Staple LX (+/- glyphosate or Liberty)	Envoke (+/- glyphosate or Liberty)	Direx (+/- MSMA or glyphosate or Liberty)
Prowl H <sub>2</sub> O + Cotoran	Dual Magnum (+/- glyphosate or Liberty)	Dual Magnum (+/- glyphosate or Liberty)	Valor SX (+/- MSMA or glyphosate or Liberty)

# Palmer amaranth control 20 d after layby





# Cotton lint yield



RRF & LL 700 lb/A > Conv.....at \$0.75/lb cotton = \$525/A

Conv. Cotton only.....PRE 145 lb/A > No PRE.....\$109/A



Conventional

Roundup Ready Flex

Liberty Link

■ No PRE

■ Prowl H2O + Cotoran PRE

# Cotton Control Programs in Louisiana

## Herbicide Programs for Palmer amaranth

Cotton System	Preplant	Preemergence	POST Over-the-top	POST-directed	Layby
Roundup Ready Flex	Valor or Treflan	Cotoran plus Prowl H2O	Glyphosate plus Dual Magnum	Caparol or Cotton Pro plus MSMA	Direx, Valor, or Reflex plus glyphosate
Liberty Link	Valor or Treflan	Cotoran plus Prowl H2O	Ignite plus Dual Magnum followed by Ignite	Caparol or Cotton Pro plus MSMA	Direx, Valor, or Reflex plus Ignite

These systems will provide control of all Palmer amaranth populations.

# Johnsongrass (*Sorghum halepense*)

- At one time, known as the World's Worst Weed
- 1 plant/cotton row-foot reduced yield 40%
  - 40% of 1000 lb lint/A = 400 lb/A
  - 400 lb/A x \$0.75/lb = \$300/A



# “Old-School” Methods of control

- Recirculating sprayer
- Treflan
  - 2x rate, incorporated
- Graminicides
  - Poast
  - Fusilade
  - Assure
  - Select



# Methods of control

- In 1996, Roundup Ready Crops introduced
- No longer an issue with glyphosate



0.5 x rate



# GR johnsongrass in LA



# Management of GR Johnsongrass

- Cotton PRE's
  - Command @ 3.33 pt/A
  - Prowl H<sub>2</sub>O @ 2 pt/A
  - Solicam @ 1.9 lb/A
  - Cotoran @ 2.4 pt/A
  - Direx @ 1.5 pt/A
  - Staple LX @ 2.1 oz/A



19 DAT

Command

Solicam


Prowl H<sub>2</sub>O

Cotoran

Staple LX

Direx





**Decent on johnsongrass, but  
horrible for Palmer amaranth**

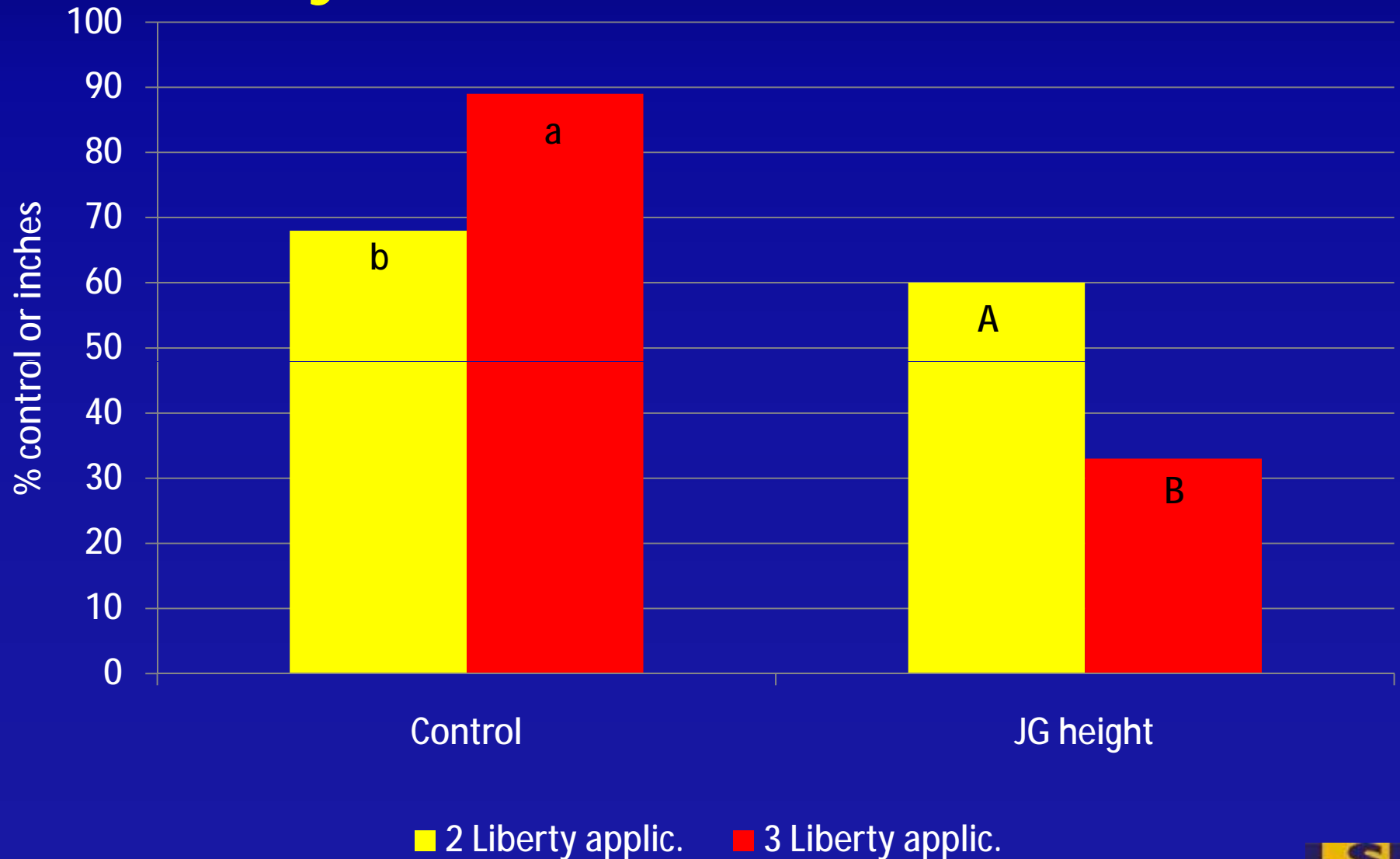


# Postemergence Options





# GR-johnsongrass control in Liberty Link or GlyTol/LL cotton at harvest



# GR-johnsongrass control in Roundup Ready Flex cotton

- No PRE's will work
  - Not Cotoran, Prowl, Solicam, Treflan
- Graminicides + glyphosate
  - Will require 2 applications
    - Very worried about graminicide resistance!
- Liberty in Liberty Link or GlyTol/LL cotton
  - Good option, need more research

# Weed Resistance to Herbicides

- Survey of Louisiana cotton consultants
- 21 responses covering 155,650 acres
- Acreage planted to RR cotton
  - 99%
- Acreage with RR cotton for 5 continuous years
  - 55%

# Weed Resistance to Herbicides

- 99% of cotton acres received glyphosate
- 9% treated only with glyphosate
- 63% treated with PRE followed by glyphosate
- Average glyphosate-based herbicide program costs = \$39



# Weed Resistance to Herbicides

- RESISTANCE MANAGEMENT PRACTICE

- 1 = not important; 2 = rarely important; 3 = occasionally important; 4 = important; 5 = very important

PRACTICE	IMPORTANCE RATING
Starting clean	5 ★
Rotate herbicide-resistance traits	4
Apply multiple herbicide MOA's	5 ★
Tillage	3
Altered planting date	2
Crop rotation	4
Cover crops or double crop	2
Narrow crop rows	3
Full labeled herbicide rates	5 ★

PRACTICE	IMPORTANCE RATING
Proper herbicide timing	5 ★
Prevent in-crop weed seed production	5 ★
Prevent postharvest weed seed production	5 ★
Prevent seed production in ditchbanks	3
Hand hoeing or hand removal	3
Clean tillage and harvest equipment (sanitation)	3

Is this weed resistant?  
Want to risk it?





# QUESTIONS?

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