The Impact of Glyphosate-Resistant Horseweed and Pigweed on Cotton Weed Management and Costs

University of Tennessee

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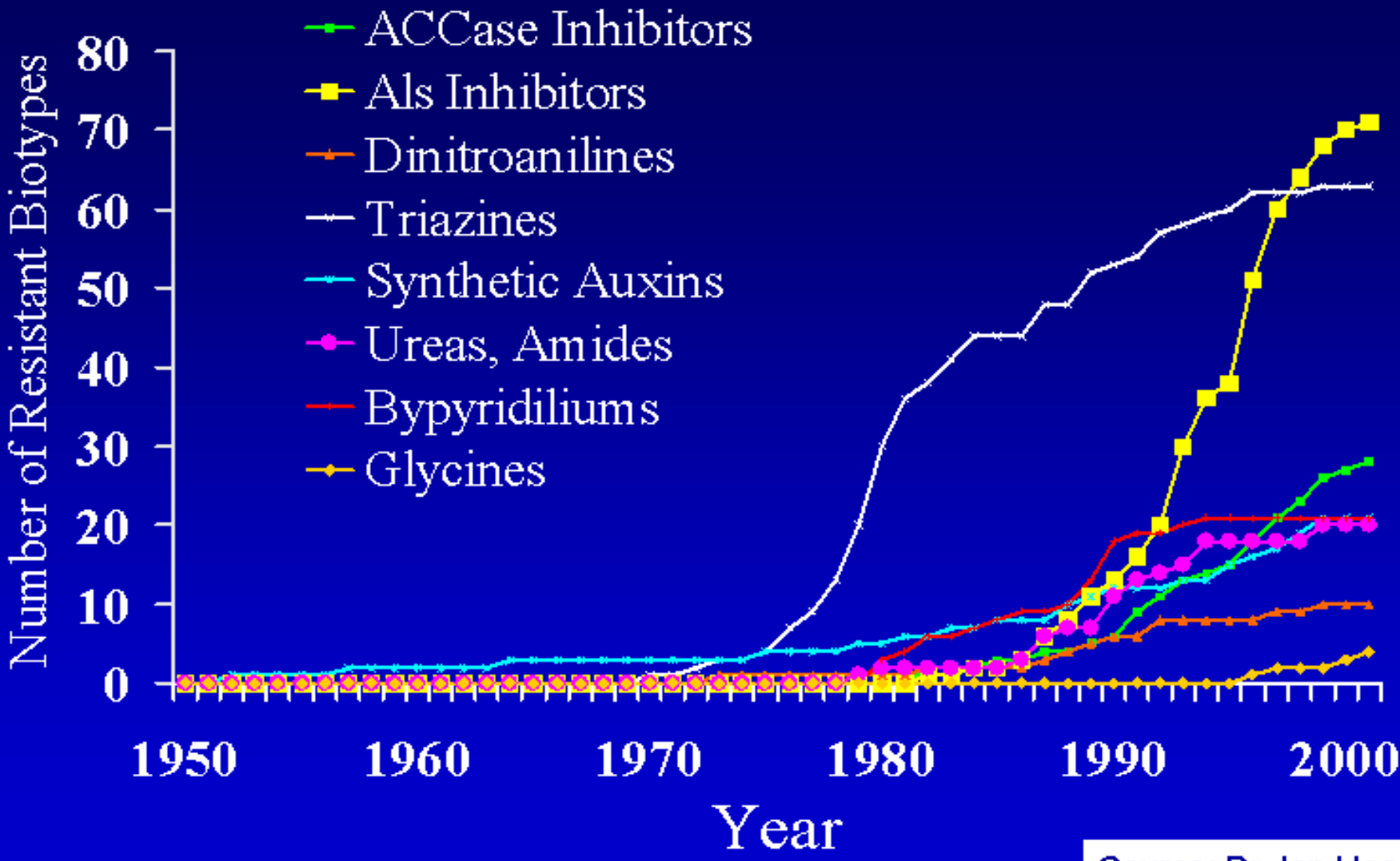
Herbicide Resistant Weeds

By Mode of Action



Source: Dr. Ian Heap
www.weedscience.com

U.S. Upland Cotton Herbicide Usage 1997 to 2003

USDA NASS 2003 Field Crops Survey

Herbicide	Area Treated	Total Applied[α]	%Change[β]	Comments
Glyphosate	70	12,870	752.9%	Caution. 4 hr restricted entry interval (REI). Relatively non-toxic.
Trifluralin	39	4,156	-22.2%	Caution. Preplant soil incorporated.
Diuron	28	1,738	101.1%	Caution. 12 hr REI.
Pendimethalin	20	1,813	-25.6%	Caution. Preemergence or preplant soil incorporated.
Pyrithiobac-sodium	12	124	-25.9%	Warning. 24 hr REI.
Prometryn	11	1,175	-28.1%	Caution. 12 hr REI. Triazine.
Fluometuron	8	755	-84.1%	Caution. 24 hr REI.
MSMA/DSMA	7	1,175	-78.6%	Caution. 12 hr REI. Arsenical.
Cyanazine	<0.5%	52	-97.6%	No longer labeled in cotton. Voluntary cancellation 1999.
Norflurazon	<0.5%	29	-97.1%	Caution. 12 hr REI.
Clomazone	<0.5%	16	-96.7%	Caution. 12 hr. REI.
Bromoxynil	<0.5%	14	-97.3%	Warning. Toxic to wildlife and fish. 96 hr REI.

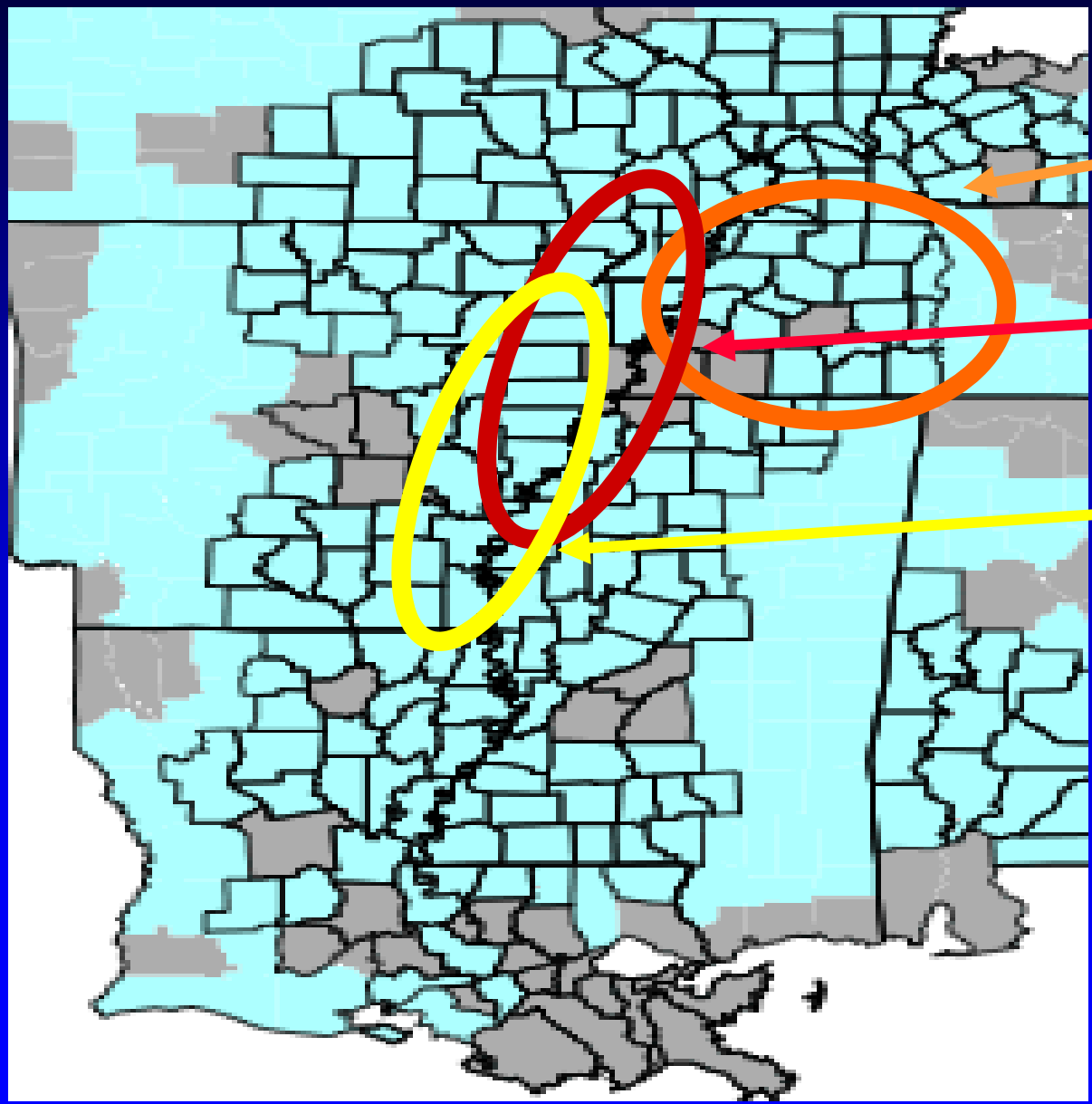
[α]2003; 1,000 lbs.

[β]Calculated values include adjustments for total U.S. upland cotton acreage. Values normalized to 1997 upland cotton acreage. Bromoxynil value based upon 1999 acreage.

History of Glyphosate-Resistance in Horseweed

- 2000 - DE – VanGessel WSSA
- 2001 - TN Lauderdale & Gibson Co.
- 2002 - KY, OH, IN, MD, & NJ
- 2003 - AR, MS, NC
- 2004 - LA, MO
- 2005 - CA, IL

Spread of GR Horseweed



Horseweed (marestail) *Conyza canadensis* (L.) Cronq.

Syn. *Erigeron canadensis* L.

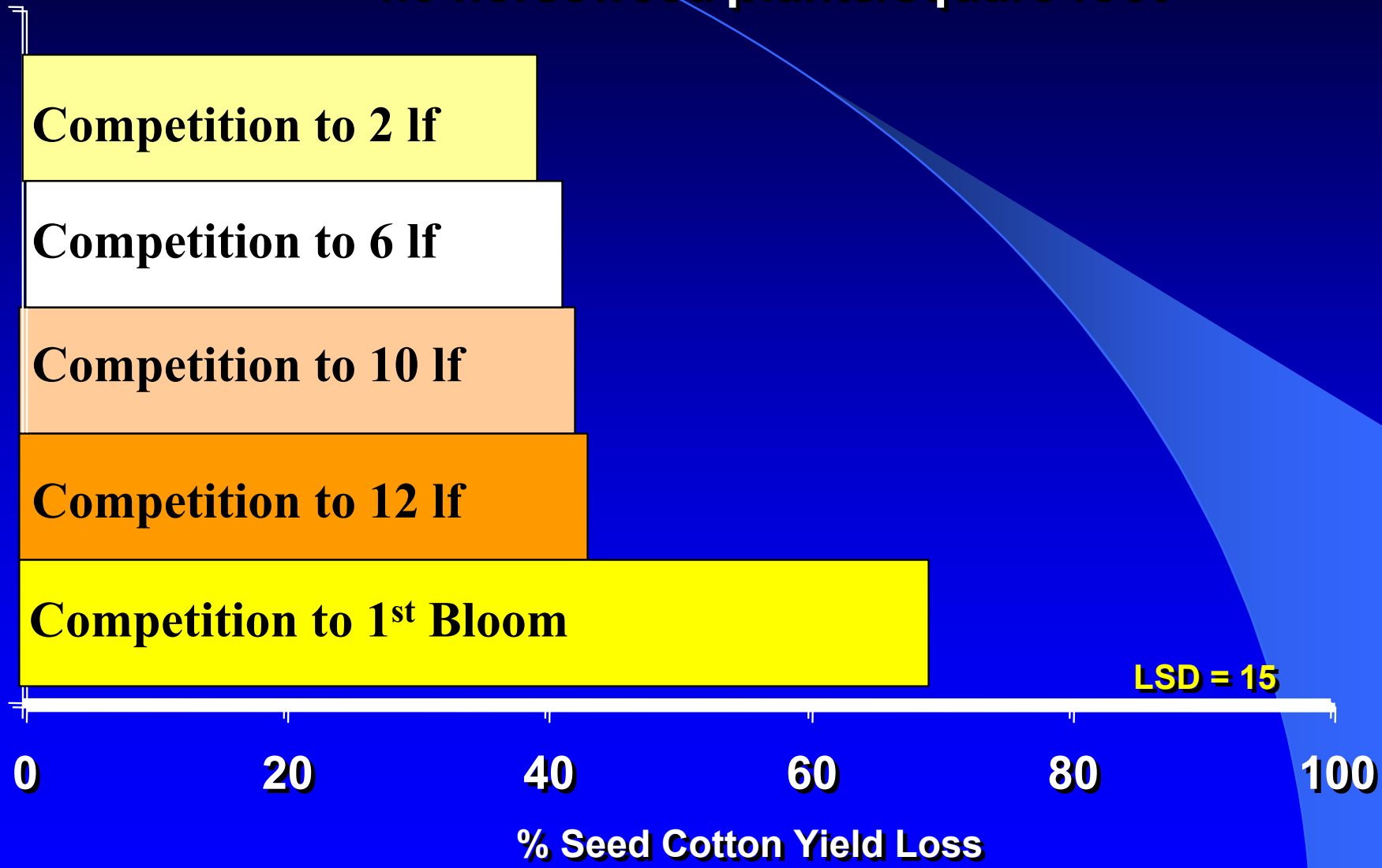
- Asteraceae (Compositae), Aster family
- Winter annual or biennial
- 6” to 9’ tall (15cm – 3m)
- 50K – 250K seeds/plant
- Taproot w/ fibrous roots – 20” wide to 40” deep
- Adapted to “periodically plant-free, undisturbed soil”

Holm et al, 1997.

Horseweed is Very Competitive

Horseweed Competition in Cotton

4.6 horseweed plants/square foot




Must Start Clean!
Photo credit: Larry Steckel

2004 Common Horseweed Burndown Program

Photo credit: Larry Steckel

Glyphosate 1qt + Tillage

Photo credit: Larry Steckel


Photo credit: Larry Steckel

Impact of GL Horseweed on Conservation Tillage

Tennessee 2004
Survey of County Ag Agents

- 18% reduction in conservation tillage in Tennessee.
- Largest cotton acreage counties in TN dropped from 80% conservation tillage to 40%.

Impact of GL Horseweed on Conservation Tillage

North Delta States

- Arkansas best estimate is 15% reduction in conservation tillage due to GR horseweed.
- Similar trends reported in Mississippi and the Bootheel of Missouri

Horseweed Burndown for Cotton

February	March	April

Glyphosate/Gramoxone + Clarity 8 to 12 ozs

Valor 2 ozs or Caparol 32 ozs or Cotoran 32 ozs or Direx 16 ozs

21 DBP

Gramoxone Inteon 48 ozs or Ignite 29 ozs + Caparol 32 ozs or Cotoran 32 ozs or Direx 16 ozs

Newly emerged to rosette (Feb to late-March)

Bolting up to 6" horseweed

(Early-April to Cotton Emergence)

Soil Residual Herbicides for GR Horseweed

Cost of GL Horseweed in No-till Cotton

Early Burndown	**Cost**
– Roundup OM 22 oz	$4.00
– Clarity 8 ozs	$5.00
– Valor 2 ozs	$8.00
– Caparol 32 ozs	$8.00
At Planting	
– Gramoxone 40 ozs	$10.00
– Cotoran 32 ozs	$10.00
Average Extra Cost	**$20.00**

What has changed in the past 36 months due to GR horseweed?

- ✓ More widespread
- ✓ In-crop emergence
- ✓ More tank mixes (EPP and Post)
- ✓ More residual herbicides
- ✓ More conventional tillage

Summary

- Conservation tillage is an economically advantageous and environmentally beneficial practice
- GR horseweed has reduced conservation tillage acres
- GR horseweed can be managed though it is more costly

History of Glyphosate-Resistance in Pigweed

2005-2006

- **Palmer pigweed 8 to 12x GA, NC, SC**
- **Palmer pigweed 2 to 4x AR, TN**
- **Waterhemp 4x MO**

GR Palmer Pigweed in Georgia

Culpepper

WeatherMax 88 oz at 1 inch

WeatherMax 88 oz at 4 inch

WeatherMax 88 oz PDIR

Palmer Amaranth Status in Tennessee

Tennessee biotype regrowth after 22 oz/A Roundup WM

Palmer Amaranth in Tennessee

Glyphosate-Tolerant Palmer Amaranth Management

- Tennessee
  - Use Max rate of glyphosate
  - Dual over-the-top with 1st or 2nd glyphosate shot
  - PD - Caparol or Dual
  - Hooded – Valor or Caparol

Cost of GR Horseweed + Palmer in Tennessee Cotton

• **March Burndown**		**Cost**
– Glyphosate +Clarity +Valor or Caparol or Cotoran		$16.00
• **Post**		
– Glyphosate + Dual		$16.00
• **Post Direct/Hooded**		
– Suprend		$8.00
– Valor +glyphosate		$8.00
• **Average Cost**		$47.00
• **Average Cost 2001**		$20.00
	Difference	$27.00

Cost of GR Palmer in Georgia Cotton

	Cost
At Planting	
– Prowl +Reflex	$18.00
Post	
– Glyphosate + Dual	$14.00
Post Direct	
– Direx + MSMA	$8.00
Hooded	
– Gramoxone Inteon	$5.00
Average Cost	$45.00

Cost of GR Palmer in Georgia Cotton 1 Field

	Cost
At Planting	
– Prowl +Reflex	$15.00
Post	
– Glyphosate + Dual	$14.00
– Glyphosate + Staple	$27.00
Post Direct	
– Direx + MSMA	$8.00
Hooded	
– Gramoxone	$5.00
Hand weeding	
– 220 hours	$23.00
Average Cost	**$92.00**

Culpepper

Summary

- GR horseweed has reduced no-till cotton acres and has cost producers an extra 15 to 20 dollars/Acre
- GR Palmer pigweed is much more problematic than horseweed due to its more competitive nature
- GR Palmer on average could cost cotton producers an extra >40 dollars/Acre to manage

Implications

- GR horseweed now has to be managed on most cotton acres in the Midsouth
- GR Palmer pigweed is a much bigger threat to cotton production and every year of delay in its arrival is big savings to producers
- Resistance management for GR Palmer is necessary

Brazil Glyphosate Resistant Weeds

a- *Lolium multiflorum* (2003) **Ryegrass**

b- *Conyza bonariensis* (2005) **Fleabane**
Conyza canadensis (2005) **Marestail**

c- *Euphorbia heterophylla* (2005) **Wild poinsettia**

d- *Sorghum halepense* (2006 suspected) **Jgrass**

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Questions
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