

# Bumps, Bruises, and Benefits of Roundup Ready Cotton Technology

Louisiana Ag Consultants  
Association

January 29, 2004

**How it used to be...**



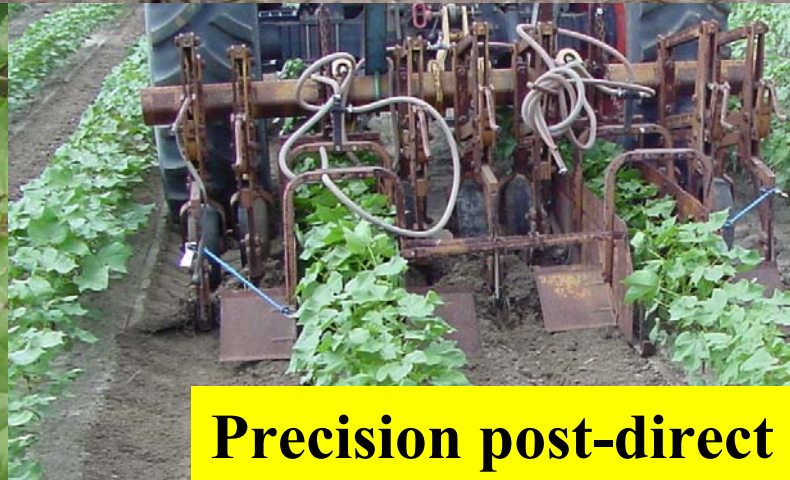
**Treflan PPI**



**Cotoran + X PRE**



**Precision cultivation**



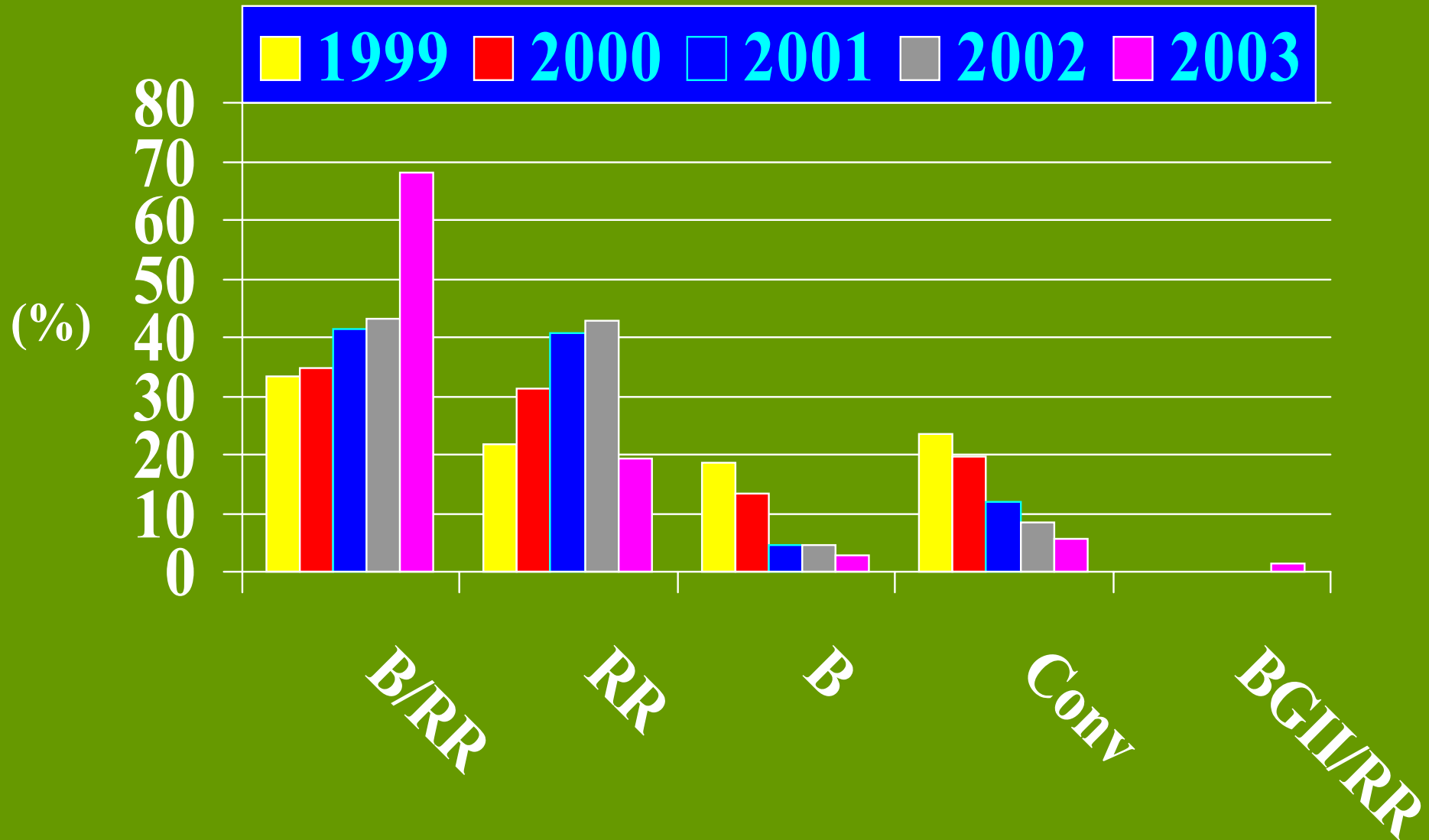
**Precision post-direct**



How it is...

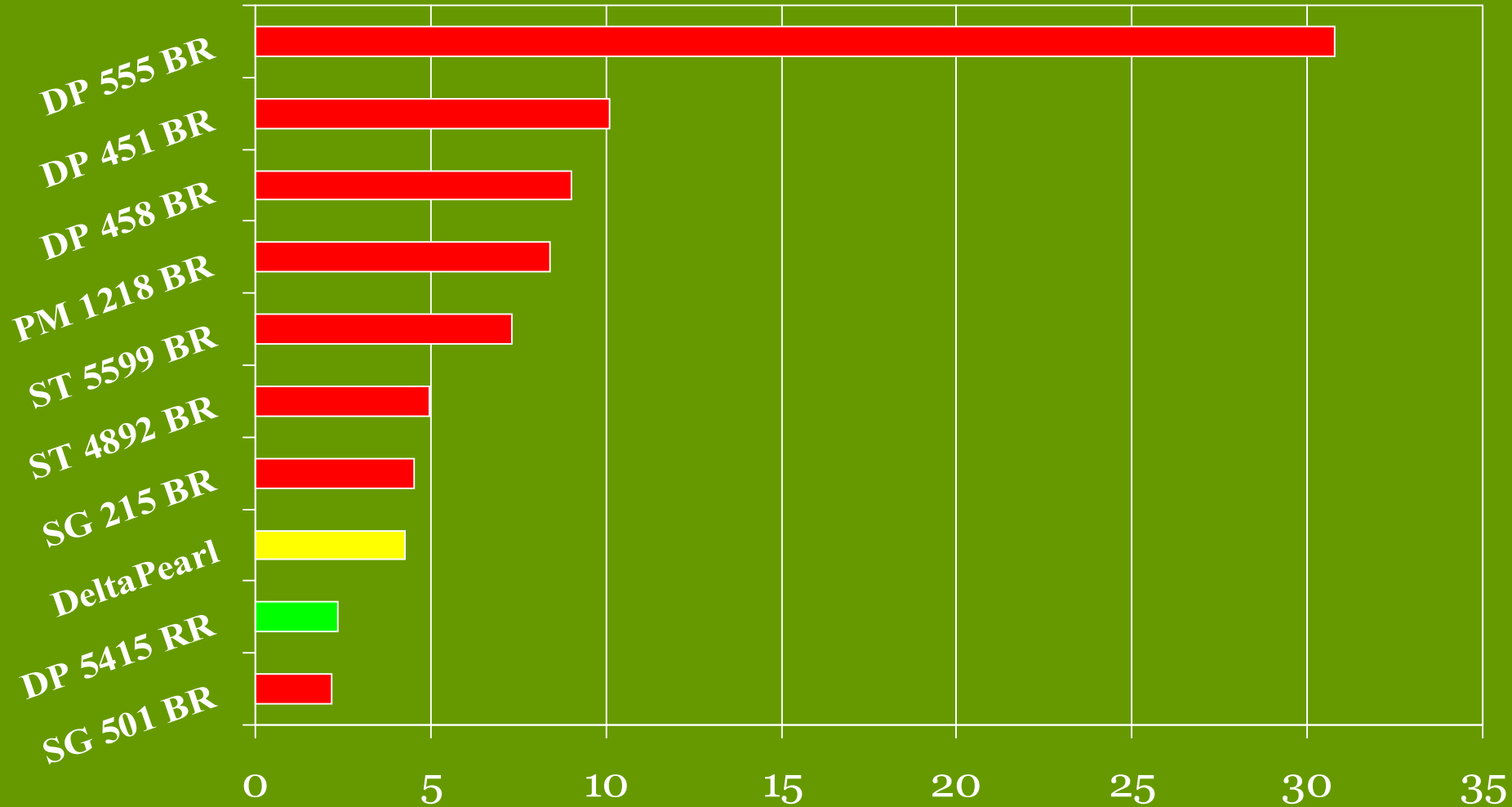


# Technology Distribution (%) of 1999 - 2003 GA Crop



# Top 10 Cotton Varieties in Lousiana, 2003

USDA AMS Survey







**Roundup Ready technology dominates cotton production in the South.**

# Roundup Ready Cotton Issues

## □ BUMPS

- glyphosate tolerance surprises
- gene insertion/backcross/selection create new variety
- phenoxy contamination in generics in 2003

## □ BRUISES

- RR variety performance – yield and quality
- subtle yield losses related to misapplication
- competition losses due to application delays
- weed resistance present and future (?)
- weed shifts

BUMPS



# Glyphosate Tolerance

## FRUIT SHED

- ❑ Surprises in Mid-South in 1997
- ❑ Surprises elsewhere linked to herbicide use and/or variety
- ❑ Isolated problems associated with misapplication every year
- ❑ Early years of RR cotton use – payouts exceeded fees

# RR Cotton

## Mechanism of Crop Tolerance

- A genetically altered enzyme system provides tolerance to glyphosate in the production of shikimic acid (amino acids)
- Glyphosate is not degraded within the plant
- Excellent vegetative tolerance but marginal tolerance in developing flower (specifically in pollen)--pollen sterilization can occur





**Glyphosate treatment during reproductive growth can cause anther malformation and pollen sterilization.**



Pline et al, 2002

## 2

# Gene Insertion / Back-crossing / Selection Creates NEW VARIETY

- ❑ DP 5415  $\neq$  NuCOTN 33B  $\neq$  DP 5415 RR  $\neq$  DP 458 BR  $\neq$  DP 468 BGII/RR
- ❑ Backcross requires 7 to 9 seasons, 4 to 5 years
- ❑ Initial transgenic varieties did not bring needed fiber quality improvements at critical time
- ❑ Troubles with Bollgard technology and variety performance remarkably limited as compared to Roundup Ready technology/variety





**In 2003 in Georgia, a few thousand acres of RR cotton treated with a couple of generic glyphosate products displayed phenoxy injury symptoms. Cotton recovered....**



BRUISES

RR Varieties are

MEDIOCRE

– “of moderate to low quality”

The American Heritage Dictionary

# RR Varieties

While there are several RR varieties to choose from, none are outstanding in

- YIELD

- QUALITY





**In variety trials in high yield environments, RR varieties are rarely in the top 20 percent.**

# RR Cotton

## Variety Performance

- ❑ Glyphosate (properly applied) does not affect the yield of RR cultivars
- ❑ In terms of yield potential, RR cultivars are not superior
- ❑ Conventional, Bollgard/RR, and Bollgard varieties outperform RR varieties

**Retired UGA Agronomist – “Planting RR cotton over the past 4 to 5 years has cost Georgia growers a bale of cotton per acre.”**





U. S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE  
COTTON PROGRAM, MARKET NEWS BRANCH  
3275 APPLING ROAD, MEMPHIS, TENNESSEE 38133  
Telephone 901-384-3016



## QUALITY OF COTTON CLASSED

Volume 45, No. 13

24-Oct-03

NUMBER SAMPLES CLASSED FOR PRODUCERS, BY **CLASSING OFFICE**  
Week and Season Ended October 23, 2003

Classing Office	Week	Season
<b>UPLAND</b>		
Abilene	43,244	215,131
Birmingham	60,323	189,610
Corpus Christi	23,955	1,124,684
Dumas	279,508	1,203,648
Florence	59,350	87,352
Lamesa	34,418	53,193
Lubbock	69,681	72,624
Macon	114,293	363,047
Memphis	226,144	666,066
Phoenix	36,204	100,037
Rayville	136,232	686,266
Visalia	100,820	114,586
<b>United States</b>	<b>1,174,172</b>	<b>4,876,234</b>
Percent tenderable	74.7	72.9
<b>AMERICAN PIMA</b>		
Phoenix	467	831
Visalia	11,809	16,805
<b>United States</b>	<b>12,276</b>	<b>17,636</b>
<b>United States all cotton</b>	<b>1,186,448</b>	<b>4,893,870</b>

MP\_CN100

THIS REPORT CAN BE OBTAINED VIA THE WORLD WIDE WEB: <http://www.ams.usda.gov/cotton/mnacs/index.htm>

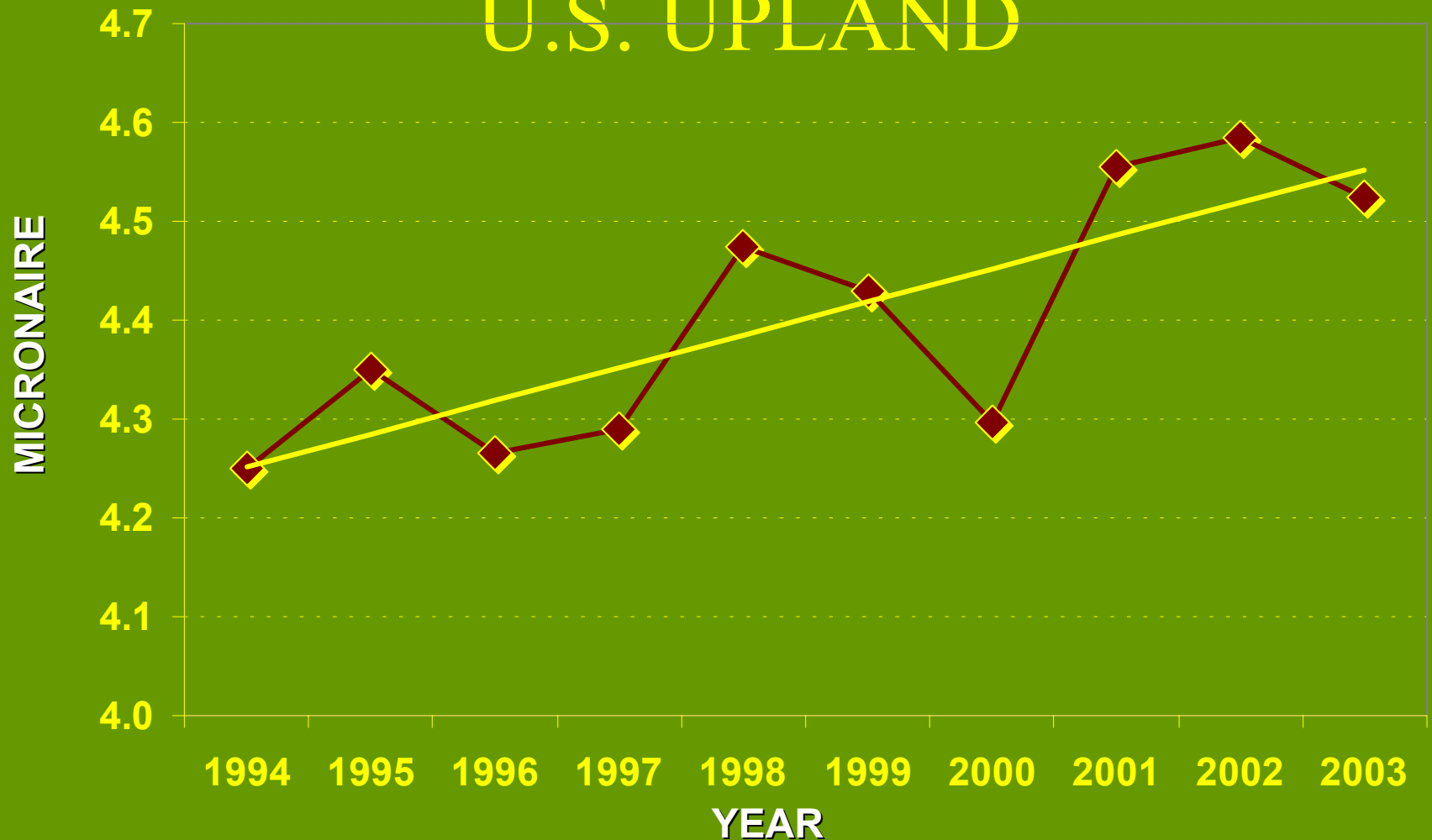
# USDA National Classing Office Report

October 23, 2003

A close-up photograph showing a person's hands holding a large, irregular mass of white cotton lint. The lint is very fluffy and appears to be contaminated with numerous small, dark, fibrous specks, possibly seeds or debris. The person is wearing a dark blue long-sleeved shirt. The background is dark and out of focus.

**Does MISAPPLICATION of glyphosate in  
RR cotton adversely affect fiber quality?**

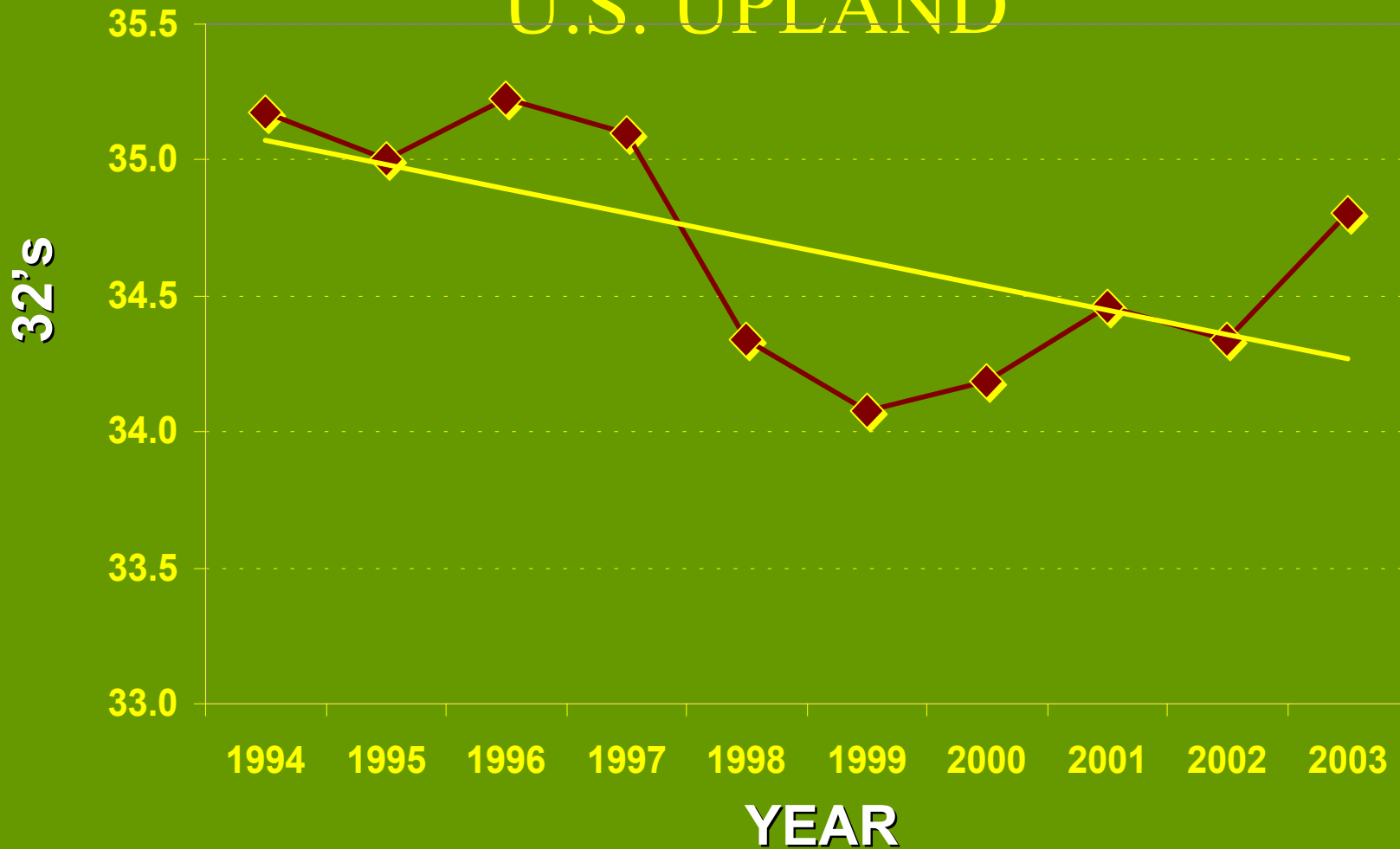
# TEN-YEAR MICRONAIRE TREND U.S. UPLAND





# TEN-YEAR STAPLE LENGTH TREND

## U.S. UPLAND



# RR Cotton Response to Glyphosate Systems

System	Timing	RDC Pvt, lint lb/A	Ponder Fm, lint lb/A
Conv	PRE, OTT, Prec PDIR	1958 a	1878 a
Roundup	4 lf OTT Prec PDIR	1953 a	1881 a
Roundup	1,4,9 lf OTT Slppy Dir	1974 a	1749 b
Cotton Fiber Analysis		NS	NS
2002 results, DP 555 BG/RR			

The first company to market with a RR variety (not BR, not BIIR) that is competitive in yield and has good if not excellent fiber quality will have a potentially dominant variety.

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...but there is DISINCENTIVE for a seed company and technology provider to cannibalize the BR market.

The “subtlety” and unpredictability of the effects of spraying glyphosate on RR cotton in the reproductive stage initially created a false sense of security.





Yield losses:  
**TARDY OVER-THE-TOP APPLICATIONS**  
**SLOPPY POST-DIRECT APPLICATIONS**



5-Leaf Cotton

Too Late?





# Not Precise Enough!



AUG 9 2001





AUG 9 2001

glyphosate  
misapplied

glyphosate  
properly applied



# EFFECTS of Glyphosate Mis-Application

Tardy over-the-top / Sloppy Post Direct

- ✓ Unpredictable in occurrence
- ✓ REDISTRIBUTE fruit 30 to 40 percent of the time
- ✓ REDUCE YIELD yield 15 to 25 percent of the time
- ✓ 8 to 10 leaf stage most vulnerable
- ✓ Does not directly affect fiber quality



**Some producers want to get all they can from their initial over-the-top application and delay applications in an effort to kill more weeds. This approach, which can reduce yield 25 percent, disregards 30 years of crop / weed competition research. The primary goal is not to kill weeds but to make cotton!**





Timing is Everything!





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**Horseweed resistance is reported in several states.  
What species are next?**









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# WEED SHIFTS







**Tropical spiderwort has spread as a result of RR technology and conservation tillage. Solutions in cotton are difficult and expensive.**



BENEFITS









**EFFECTIVE, EASY Weed Control**

The market SHOUTS that RR  
Technology has been a  
resounding success, especially in  
the South.

Cotton planted in RR varieties (including BR) occupy  
greater than 85 percent of the acreage east of Texas.



Roundup Ready Weed Management...

there are many, many options.

# Roundup Ready Programs

## Options (6)

PPI / PRE

OTT 1-2 LF

OTT 2-4 LF

PDIR 6-10 LF

LAYBY

## Preferred Standard

Dinitroaniline

glyphosate or

glyphosate + Staple

diuron or prometryn +

MSMA

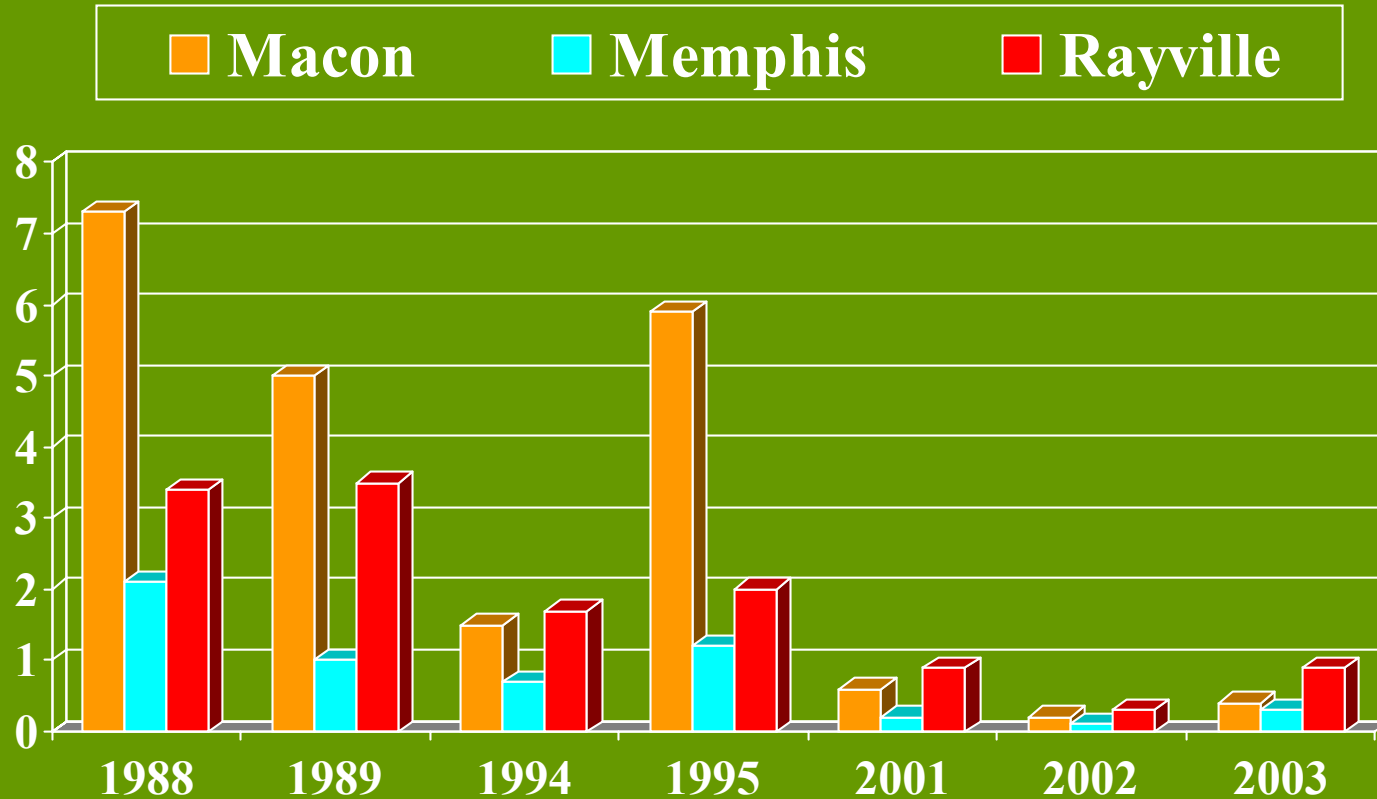
**The OLD**



**The NEW**



# Percent Bales Reduced in Grade because of GRASS







**Conservation  
tillage has flourished.**





**The OLD**



**The NEW**





A young green plant with bipinnate leaves is growing in brown soil. The plant has several stems with multiple pairs of oval-shaped leaflets. The soil is dark brown and appears slightly cracked. There are some small, dry plant fragments scattered around the main plant.

**Some terrible pests  
of the past are now  
controlled with ease.**



RR technology has made some farmers better, many farmers bigger, and too many sloppier and less precise. It has solved a huge problem of skilled labor and made the formerly tedious effort of weed control EASY.





The lure of convenience and ease of weed management  
should not distract from the ultimate goal.

