



**Managing New Cotton
Varieties**

Jared Whitaker

University of Georgia

New Variety Management

☞ Variety Selection

☞ Management

- Factors
- Potential Impact
- Beltwide Project from 2012 & 2013
- Other Potential Issues

☞ Impact on Producer....

Cotton Variety Selection

- New varieties are released more rapidly than before
- Little if any time is available to extension and research personnel prior to release
- Ideas on management must be developed quickly
- What can research and extension do to help with variety shifts.....

Factors Affecting Variety Performance



- 🌱 **Environmental Conditions**
- 🌱 **Soil Type & Productivity**
- 🌱 **Soil Fertility**
- 🌱 **Planting dates**
- 🌱 **Plant population**
- 🌱 **Irrigation**
- 🌱 **Rooting Zone**
- 🌱 **Weed and pest management**

Effect of Irrigation and Plant Growth Regulator Use On Variety Performance

Jared Whitaker¹, Robert L. Nichols², Tom Barber³, Darrin Dodds⁴,
Robert Hutmacher⁵, Michael Jones⁶, John Kruse⁷, Chris Main⁸,
Randy Norton⁹, Sam Wang⁹ and David Wright¹⁰

¹University of Georgia – Statesboro, GA

²Cotton Incorporated - Cary, NC

³University of Arkansas Division of Agriculture - Little Rock, AR

⁴Mississippi State University – Starkville, MS

⁵University of California – Davis and West Side REC, Five Points, CA

⁶Clemson University – Florence, SC

⁷LSU Agricultural Center - St. Joseph, LA

⁸University of Tennessee – Jackson, TN

⁹University of Arizona – Safford, AZ

¹⁰University of Florida – Quincy, FL

Beltwide 2014

Questions



- Can variety performance be affected by management in dryland and irrigated conditions
- Will different PGR approaches be needed for certain varieties under dryland and irrigated conditions.

Objectives

- Determine main factor in cotton performance
- Determine if interactions exist with varieties, irrigation and PGR applications.
- Evaluate variety response to irrigation in terms of yield and fiber quality parameters.
- Determine best management practices for recently released cotton varieties.

Locations – 7 (10 total trials)

- ☞ Marianna, AR
 - Planted May 11, 2012
 - Commerce Silt Loam
 - Furrow, 2 inch deficit
- ☞ Starkville, MS
 - Planted May 17, 2012
 - May 14, 2013
 - Marietta Fine Sandy Loam
 - Furrow, 2 inch deficit
- ☞ Jackson, TN
 - Planted May 11, 2012
 - Collins Silt Loam
 - Surface drip, 1 inch water/week
- ☞ Red River Research Center, LA
 - Planted May 12, 2012
 - Very fine sandy loam
 - Furrow irrigation
- ☞ Maricopa Ag Center, AZ
 - Planted May 2, 2012
 - April 25, 2013
 - Casa Grande Sandy Loam
 - Furrow Irrigation
- ☞ NFREC Quincy, FL
 - Planted May 25, 2012
 - June 13, 2013
 - Dothan Loamy Sand
 - Pivot irrigation
- ☞ Midville, GA
 - Planted June 13, 2013
 - Dothan Loamy Sand
 - Subsurface drip, UGA checkbook

Procedures

- SPLIT PLOT DESIGN
 - Factorial Treatment Arrangement
 - ▣ VARIETIES – 5
 - Varied among Regions
 - ▣ IRRIGATION – 2
 - Irrigated or Dryland
 - ▣ PGR REGIME – 3
 - Untreated
 - STD = 16 oz mepiquat chloride at bloom
 - AGR = 16 oz mepiquat chloride at pinhead square fb
- 16 oz at bloom

Varieties Planted

Year	Southwest	MidSouth	Southeast
2012	DP 0949 B2RF DP 1044 B2RF PHY 499 WRF PHY 565 WRF ST 4498 B2RF	AM 1511 B2RF DP 0912 B2RF FM 1944 GLB2 PHY 499 WRF ST 5288 B2F	DP 0912 B2RF DP 1050 B2RF FM 1944 GLB2 PHY 375 WRF PHY499 WRF
2013	DP 1044 B2RF DP 1359 B2RF FM 1944 GLB2 NG 1511 B2RF PHY 499 WRF	AM 1511 B2RF DP 0912 B2RF FM 1944 GLB2 PHY 499 WRF ST 5288 B2F	DP 1050 B2RF DP 1137 B2RF DP 1252 B2RF PHY 499 WRF ST 6448 GLB2

Variables Measured

- Plant Population
- Plant Height
 - ▣ HT60 – Height 60 days after planting
 - ▣ FHT – Final Height
- First Fruiting Node – (FFN)
- Total Nodes (TN)
- Nodes of Uppermost Harvestable Boll (NUHB)
- Lint Yield
- Fiber Quality

Statistical Analysis:

Data analyzed with Proc Mixed in SAS

- ▣ Fixed effects of PGR, IRR, and VAR (with Interactions)
- ▣ Locations considered random effects

- Variety Effects

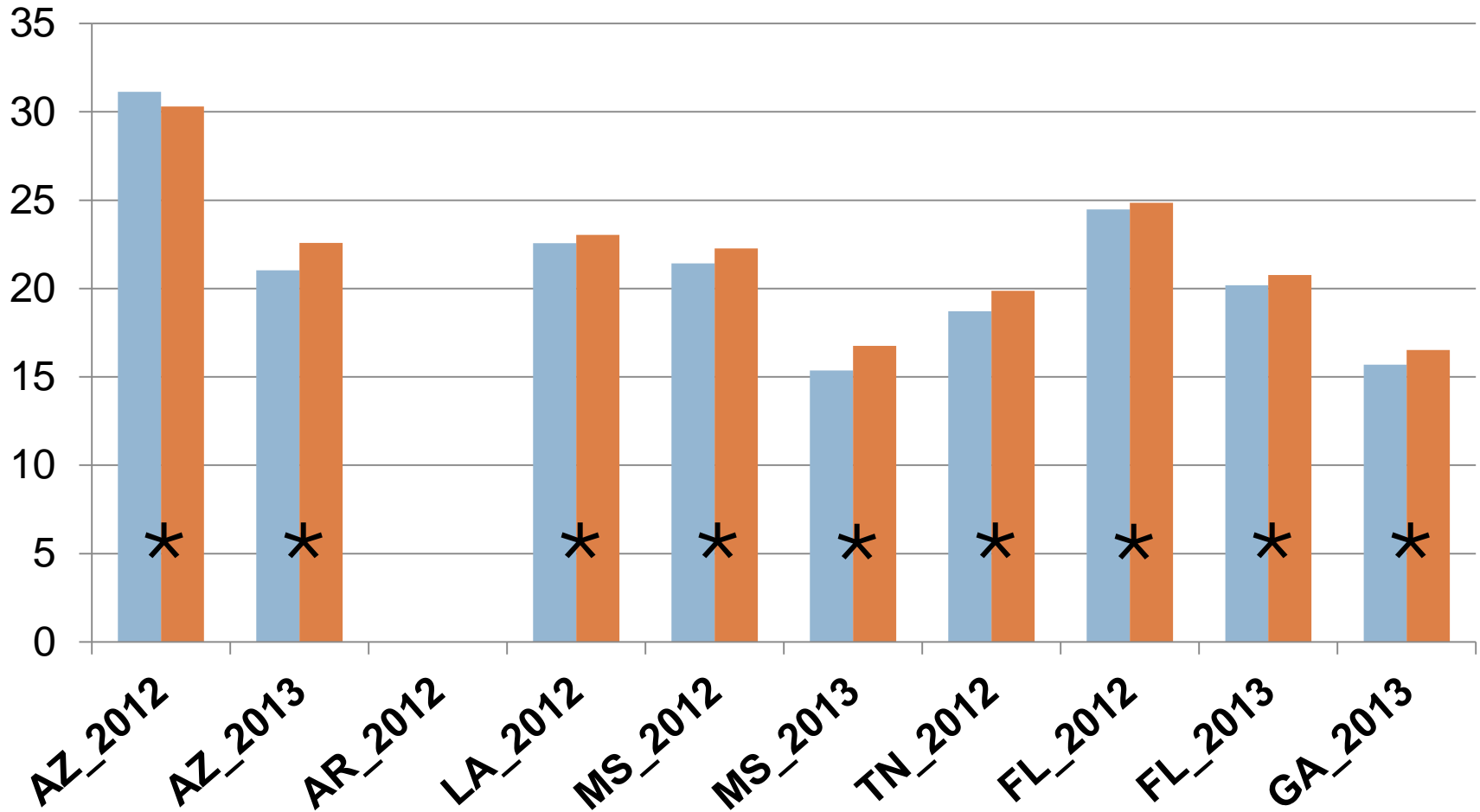
Data separated by Regions (and/or similar varieties)

- SW 2011
- SW 2012
- MS (2012 & 2013)
- SE 2012
- SE 2013
- Mean separation – Fisher's Protected LSD ($P = 0.1$)

Irrigation Effect on Performance



Total Nodes (averaged over variety and PGR)



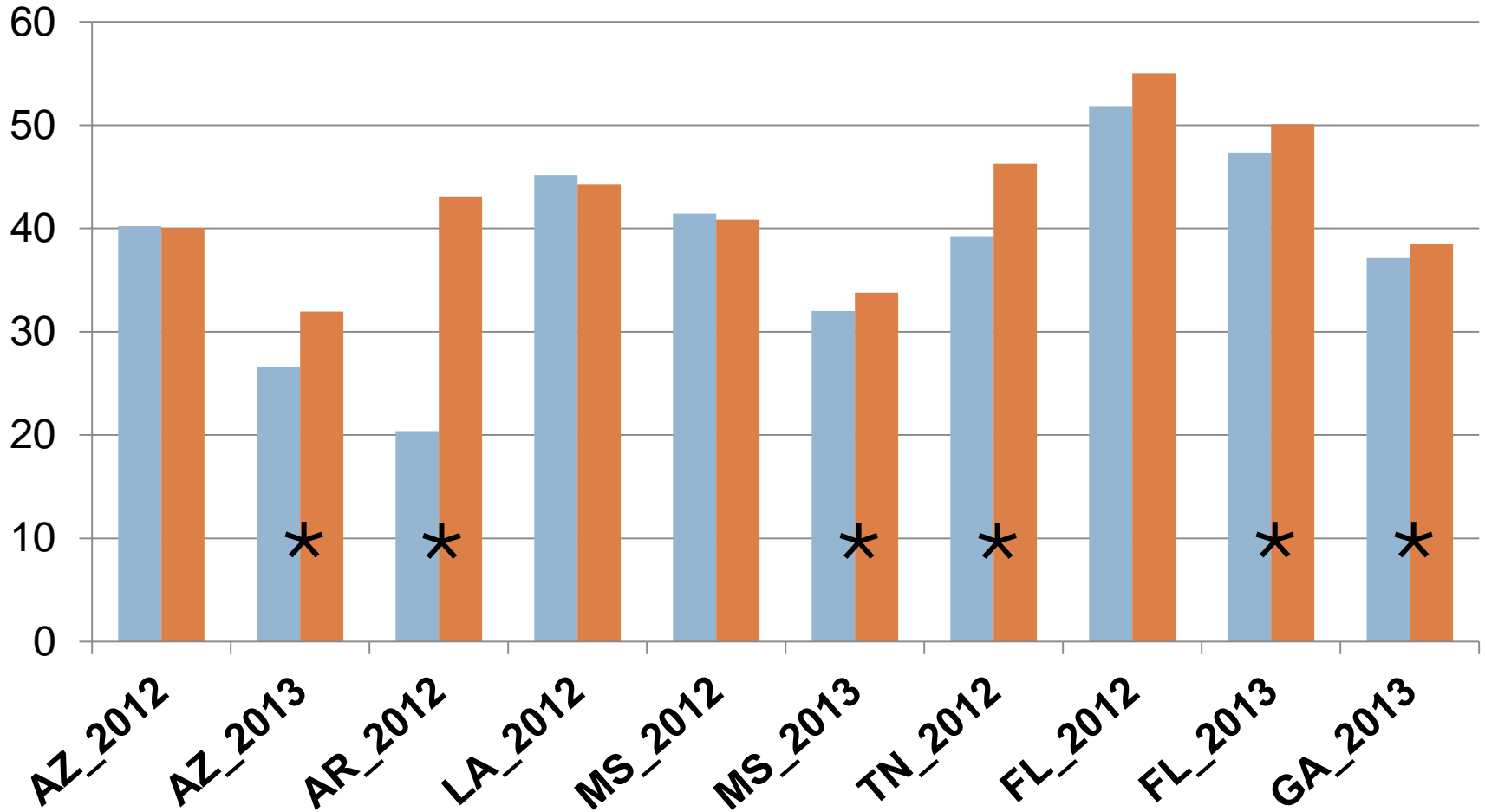
Irrigation statistically affected total nodes in all trials

Differences were minor (increased by an average of 0.5 nodes/plant)

Irrigation Effect on Performance



Final Plant Height (averaged over variety and PGR)

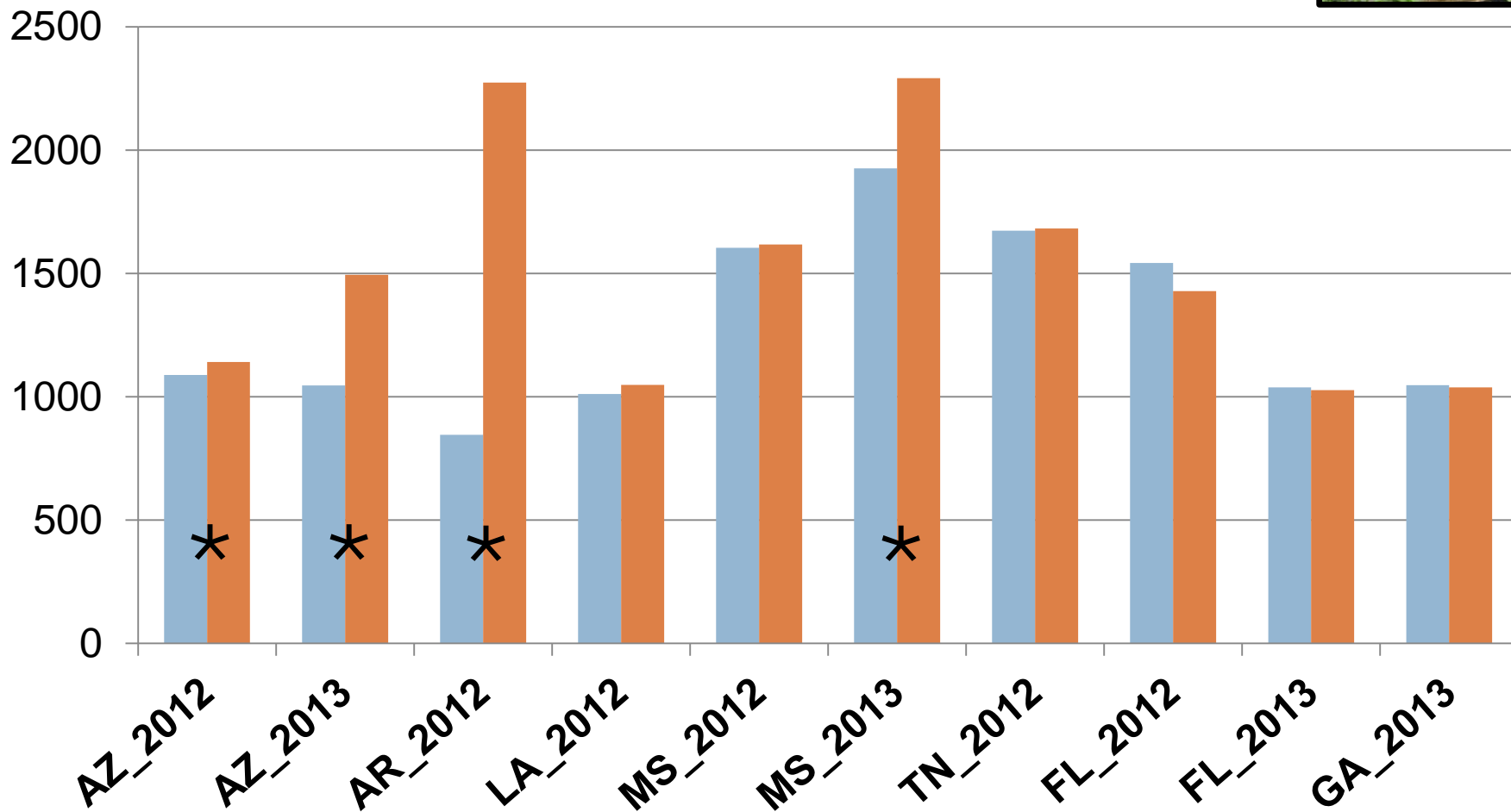


Irrigation affected height in 6 of 10 trials (Increased height by average of 7")

REGIONS - 1 of 2 in Southwest, 2 of 5 in Midsouth, 2 of 3 in Southeast

Irrigation Effect on Performance

Lint yield (averaged over variety and PGR)



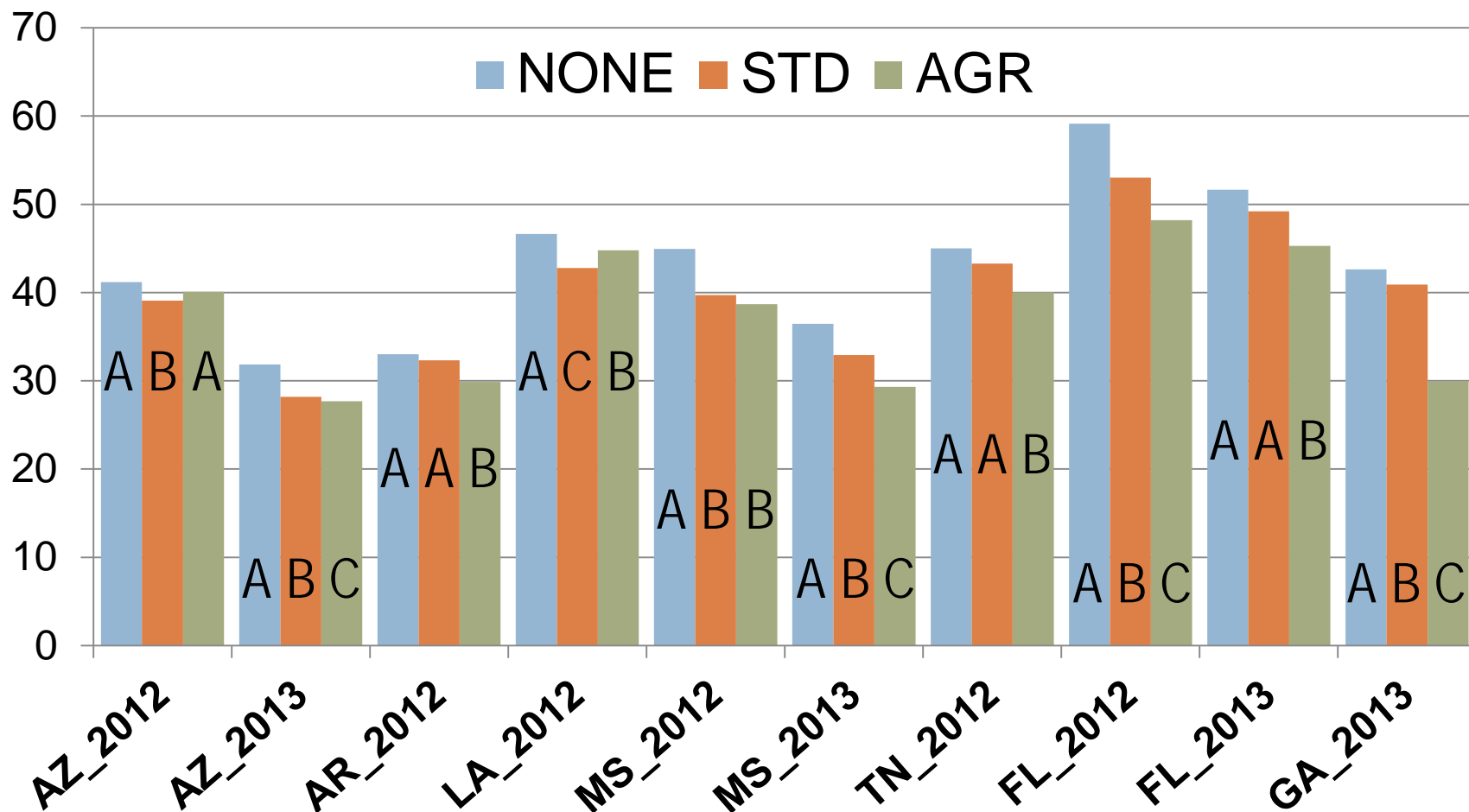
Irrigation affected Lint yields in 4 of 10 trials (Increased yields by average of 222 lbs/A)

REGIONS - 2 of 2 in Southwest, 2 of 5 in Midsouth, 0 of 3 in Southeast

PGR Effect on Performance



Final Plant Height (averaged over variety and PGR)



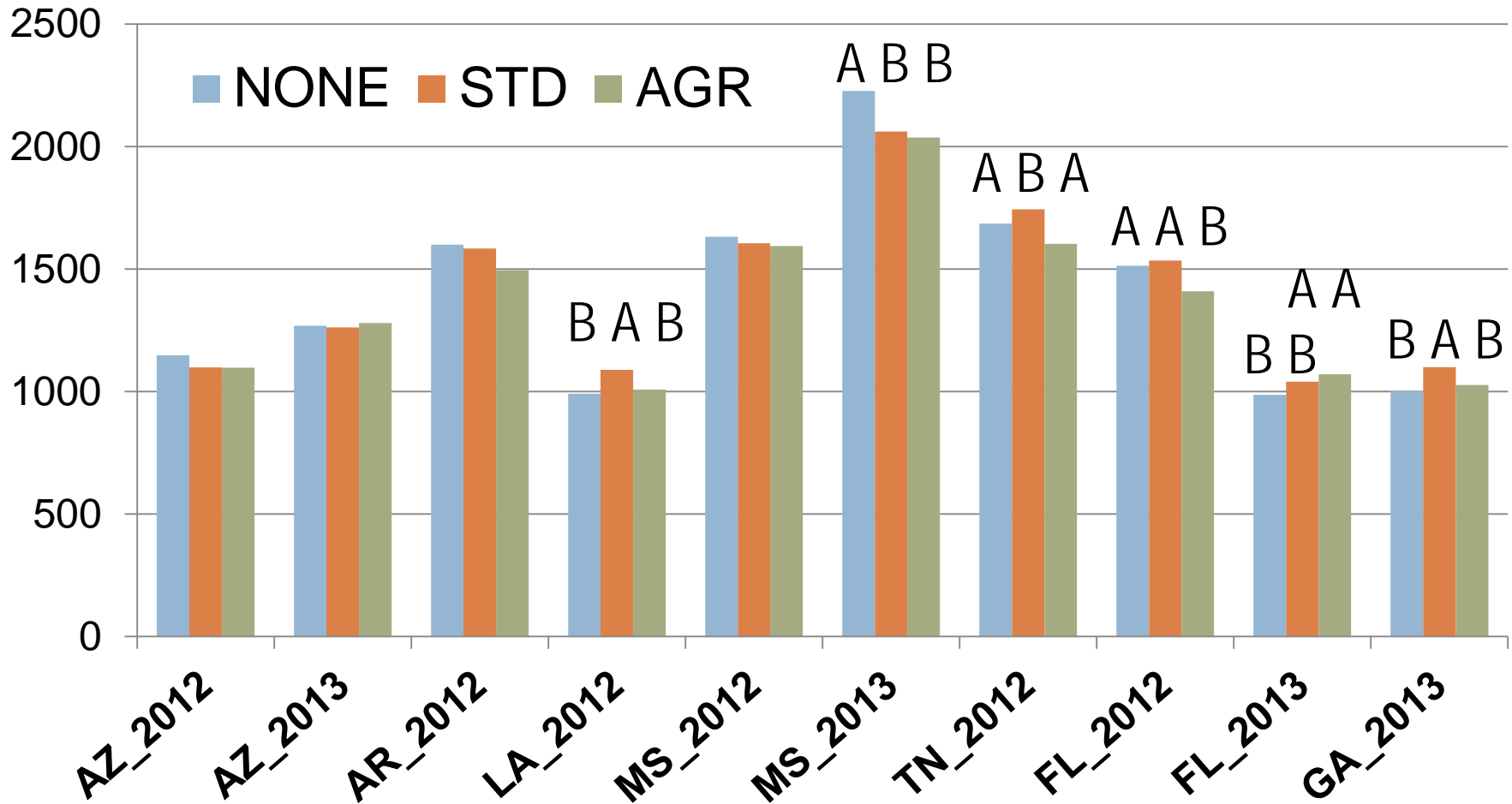
PGR affected height in all locations

NONE > STD > AGR in 4 locations
NONE = STD > AGR in 3 locations

PGR Effect on Performance



Lint yield (averaged over variety and PGR)



PGR affected lint yields in 6 of 10 trials (Differences variable)

SW – NONE, MS – 3 of 6, SE – ALL

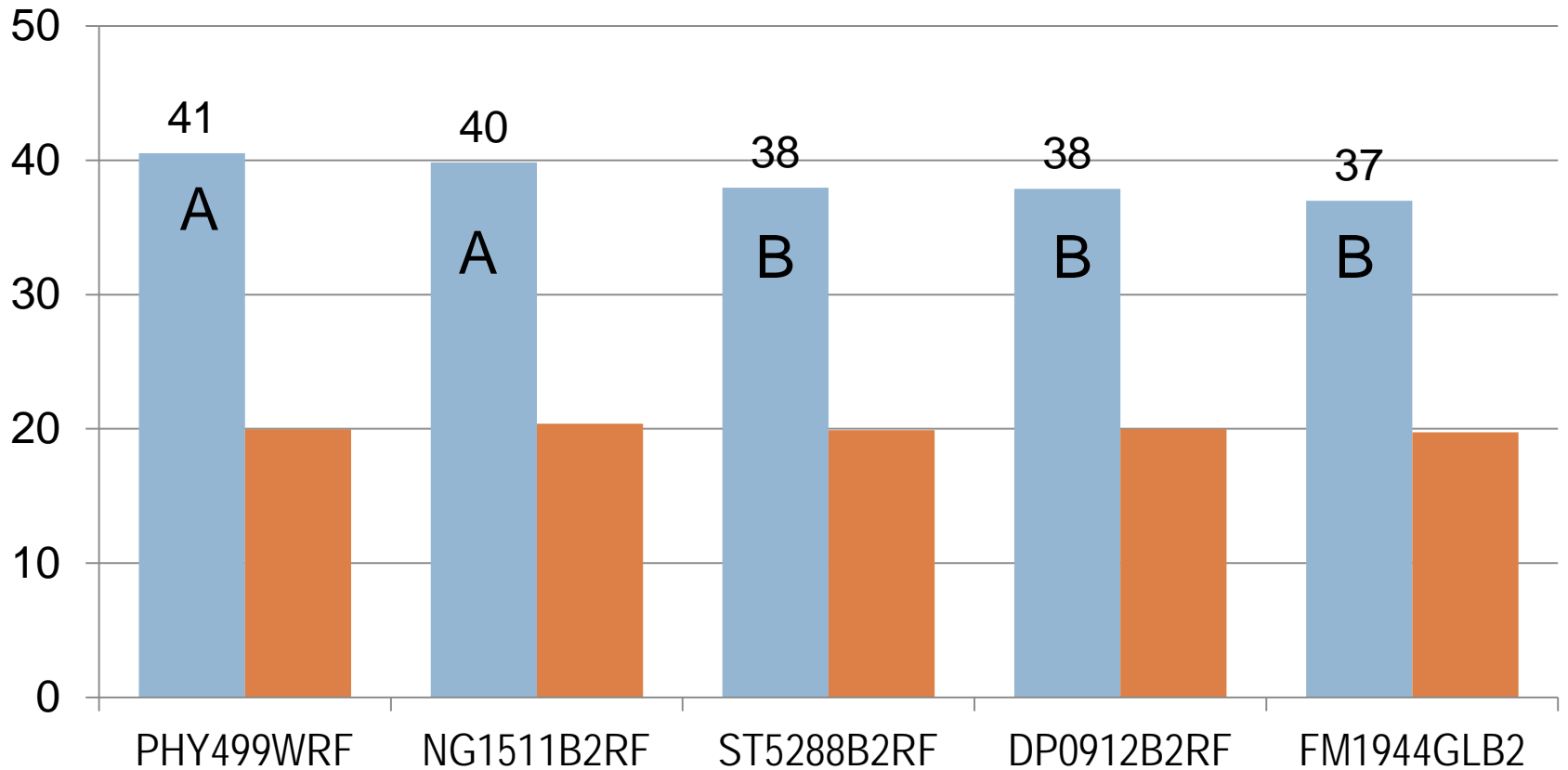
Varieties Planted

Year	Southwest	MidSouth	Southeast
2012	DP 0949 B2RF DP 1044 B2RF PHY 499 WRF PHY 565 WRF ST 4498 B2RF	AM 1511 B2RF DP 0912 B2RF FM 1944 GLB2 PHY 499 WRF ST 5288 B2F	DP 0912 B2RF DP 1050 B2RF FM 1944 GLB2 PHY 375 WRF PHY499 WRF
2013	DP 1044 B2RF DP 1359 B2RF FM 1944 GLB2 NG 1511 B2RF PHY 499 WRF	AM 1511 B2RF DP 0912 B2RF FM 1944 GLB2 PHY 499 WRF ST 5288 B2F	DP 1050 B2RF DP 1137 B2RF DP 1252 B2RF PHY 499 WRF ST 6448 GLB2

Variety Effect on Performance - MIDSOUTH

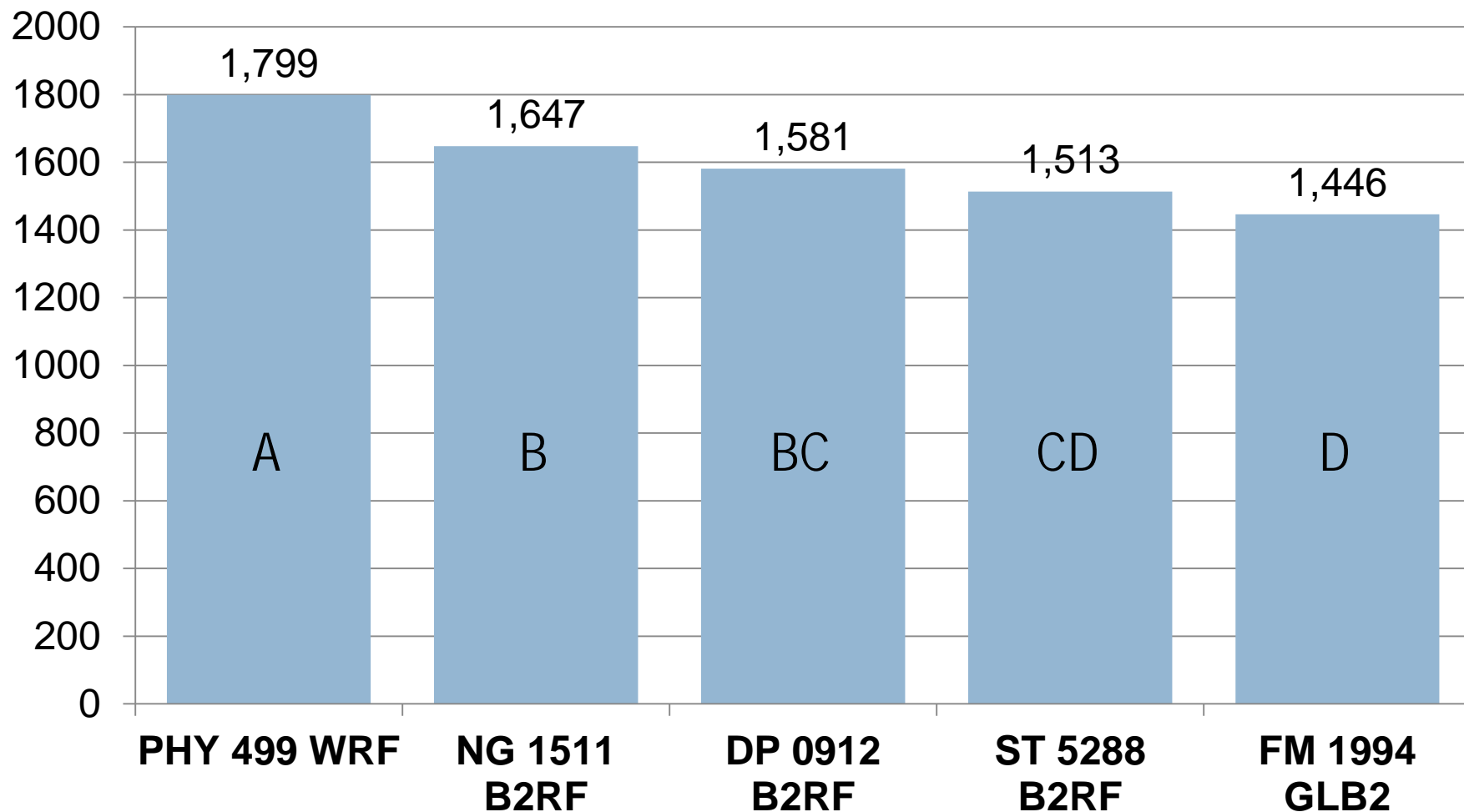
Plant Height & Main-stem Nodes

(averaged over location and PGR)



Variety Effect on Performance - MIDSOUTH

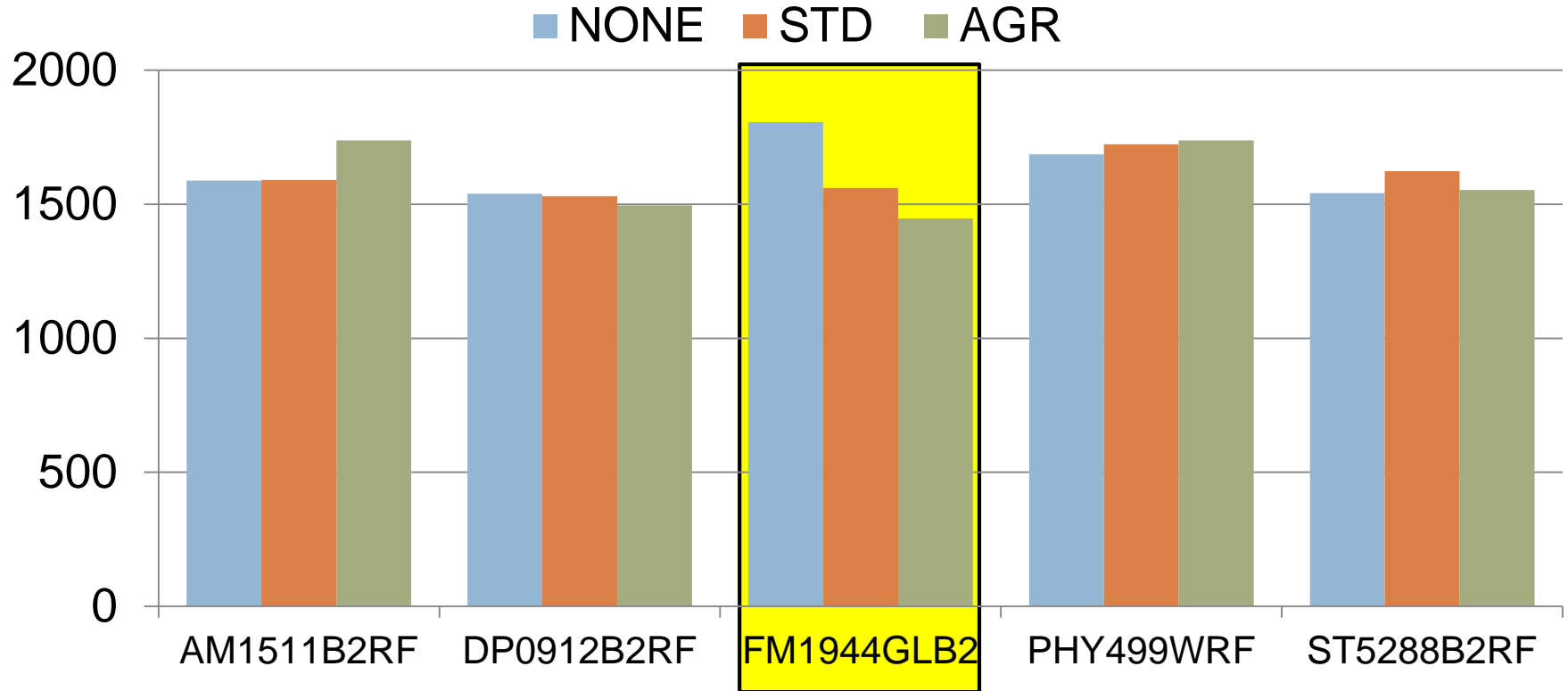
Lint yield (averaged over location and PGR) 2012 & 2013



LSD (P=0.1) = 101 lbs/A

LINT YIELD – VAR * PGR INTERACTIONS

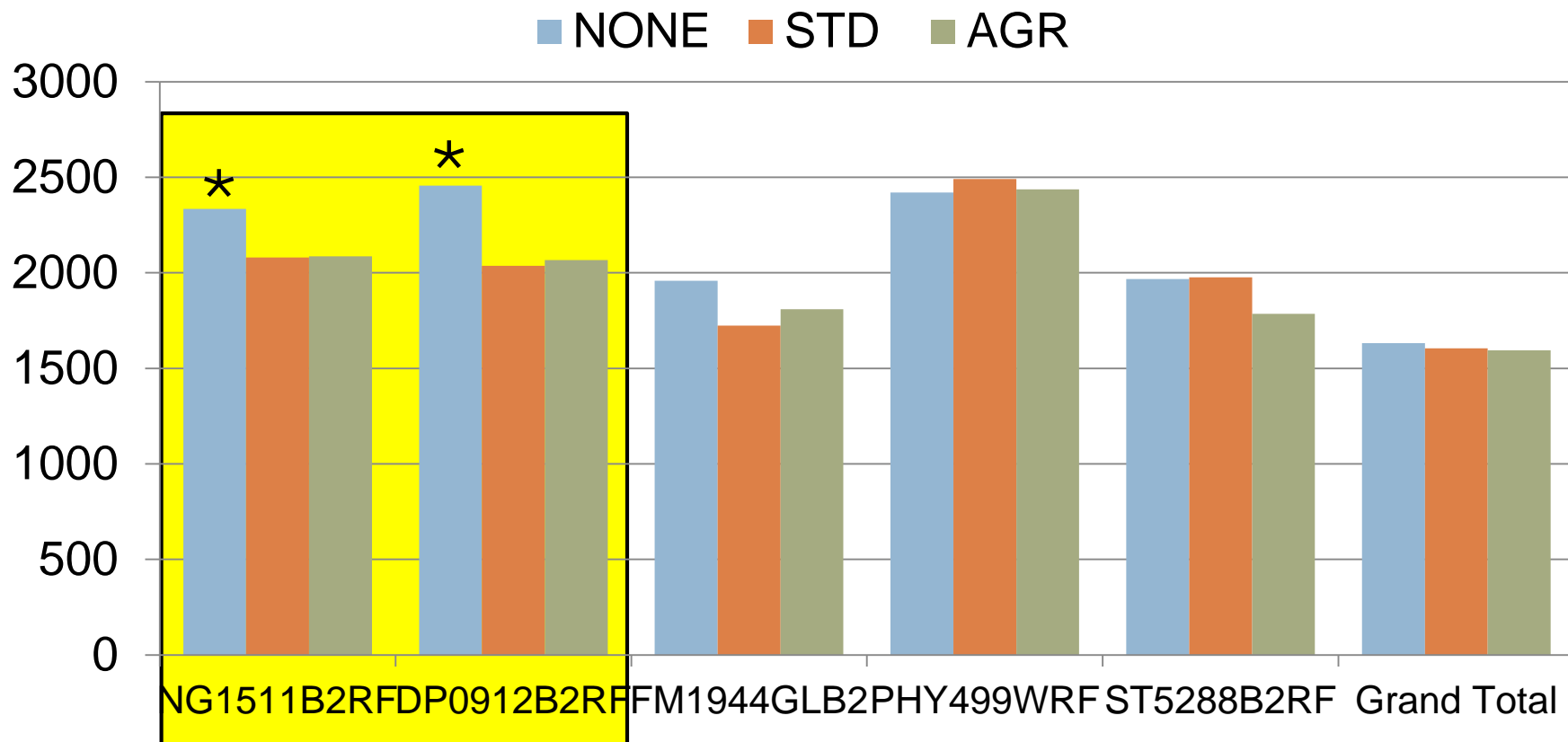
MS 2012 (data pooled over IRR)



Yields statistically reduced when PGR applications applied to FM 1944 GLB2
Other varieties not affected by PGR applications

LINT YIELD – VAR * PGR INTERACTIONS

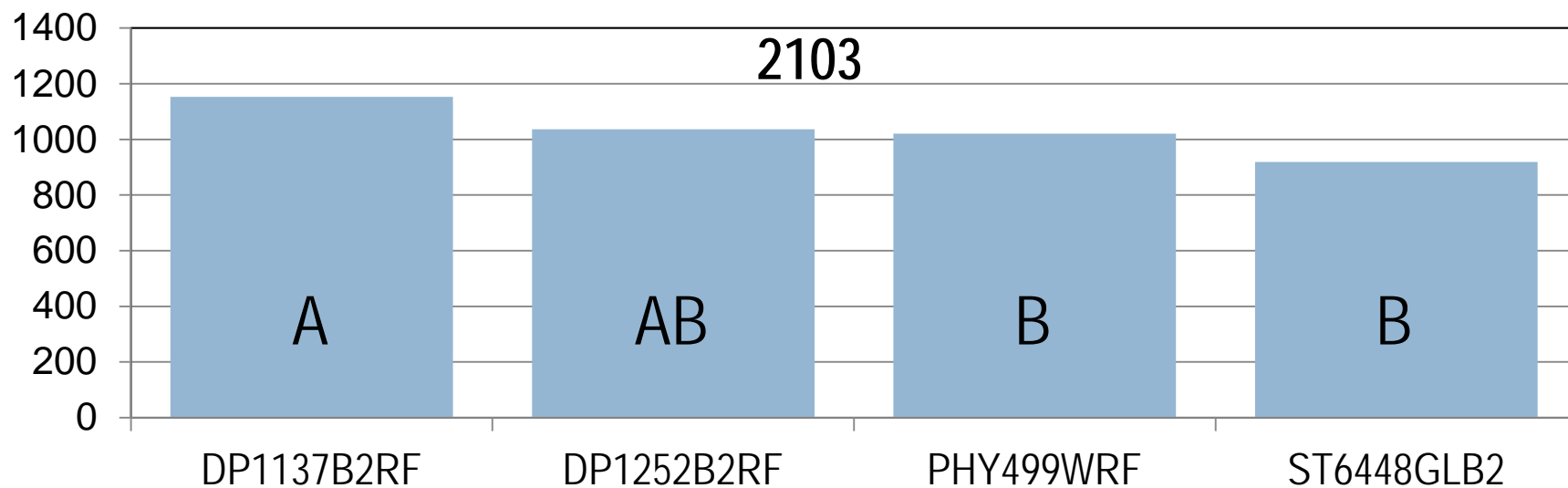
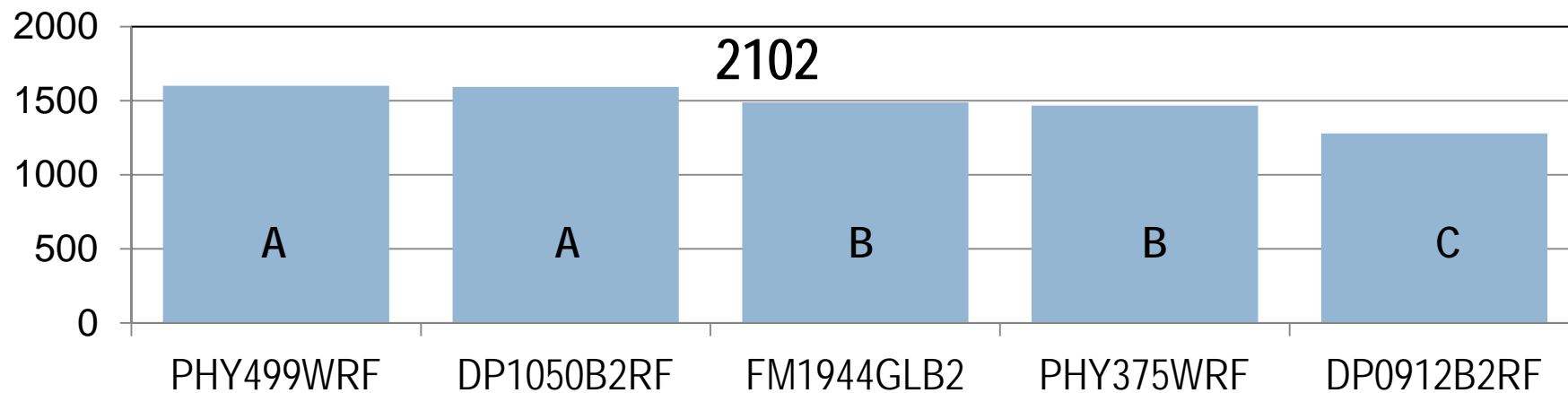
MS 2013 (data pooled over IRR)



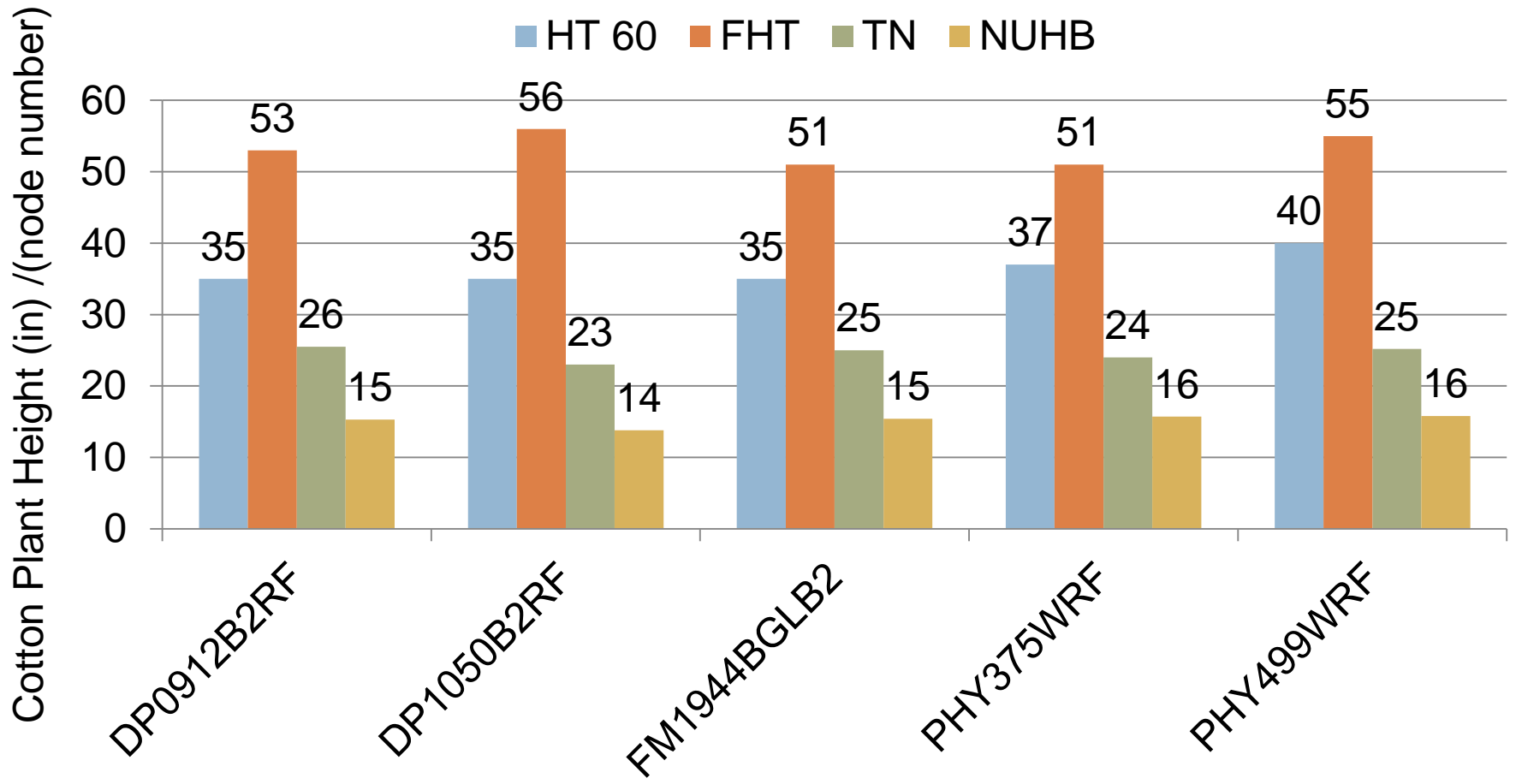
PGR reduced yield when applied to 1944 GLB2 & NG 1511B2RF
 Other varieties not affected by PGR applications

SOUTHEAST – Variety Effect on Performance

Lint yield (averaged over PGR)

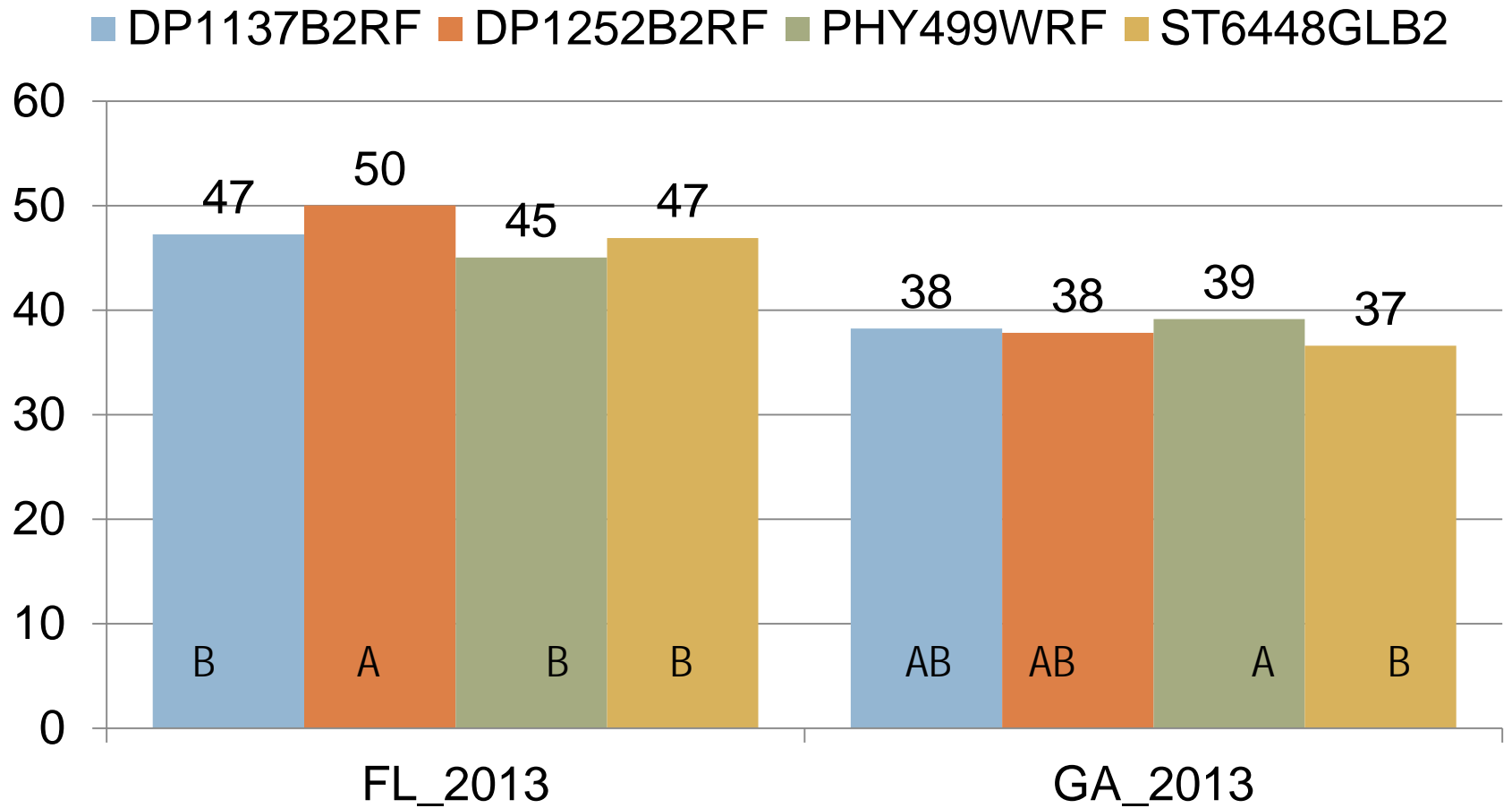


SOUTHEAST VARIETY EFFECTS 2012



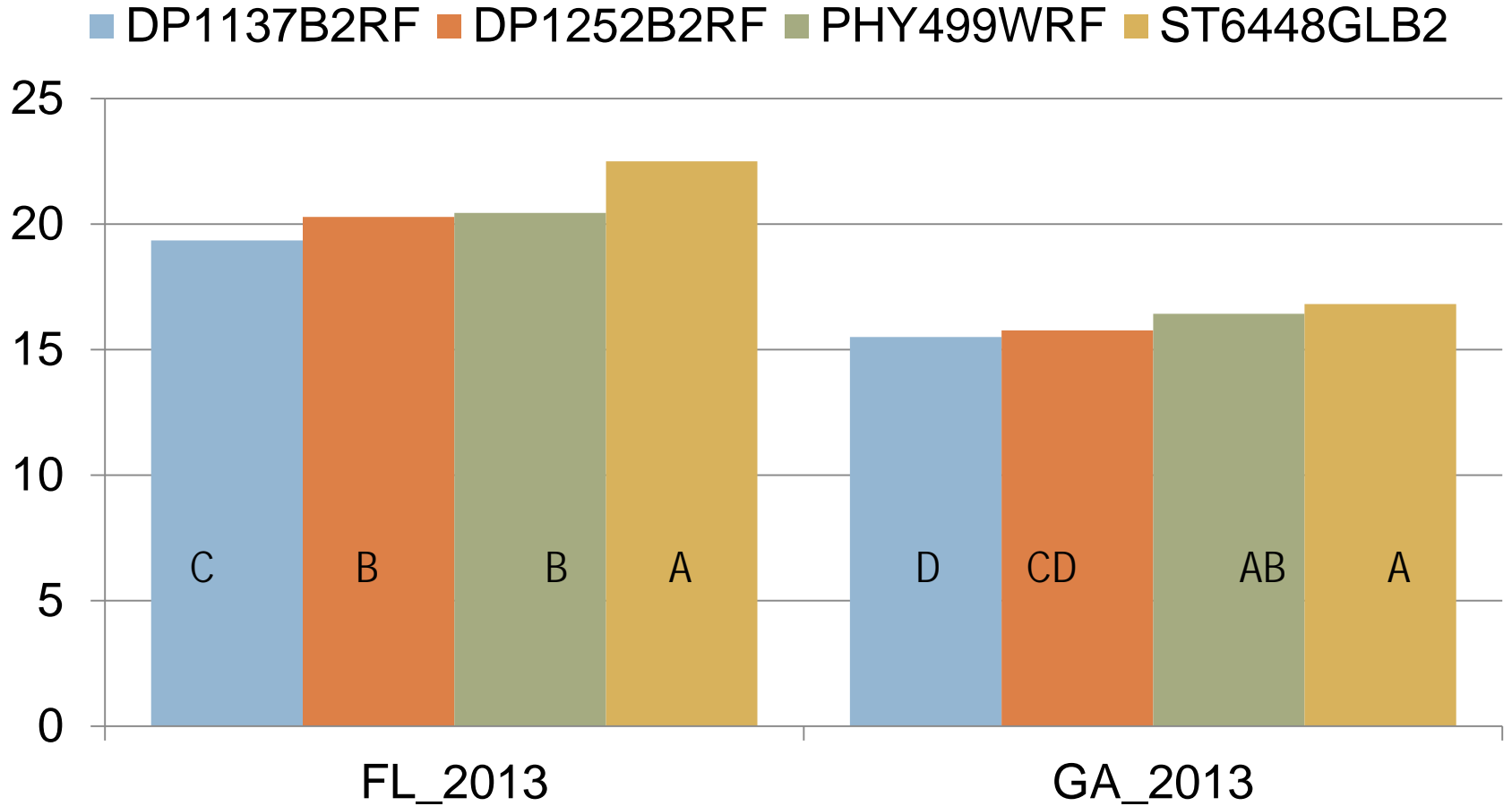
SOUTHEAST VARIETY EFFECTS

2013 – Plant Height



SOUTHEAST VARIETY EFFECTS

2013 – Total Nodes



Discussion



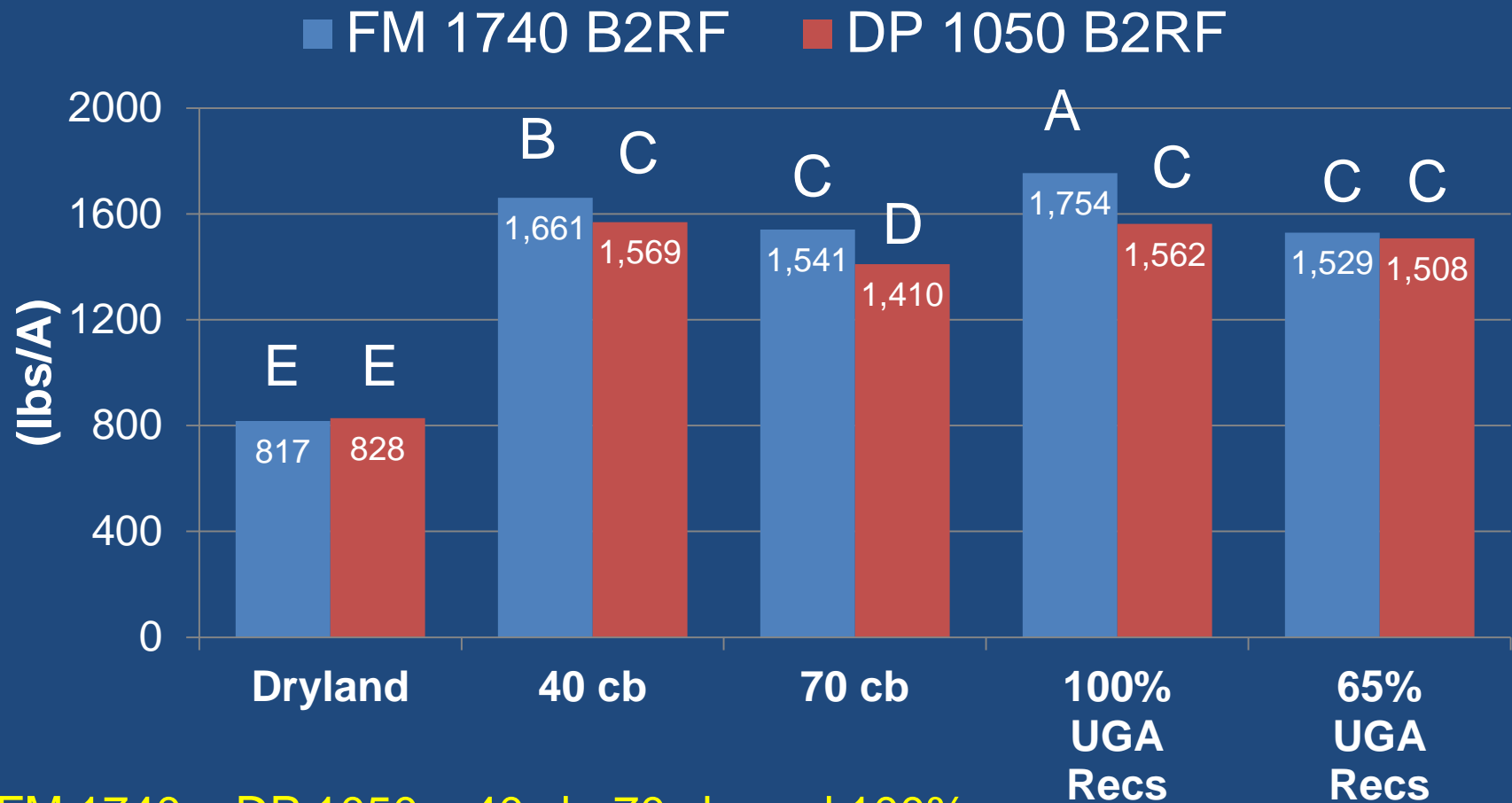
- Main effects of Variety and Irrigation significant for most all variables measured
 - ▣ Varieties differ in vegetative growth and node dev.
 - ▣ More water = more growth
- Plant growth regulators affected plant height
 - ▣ Little effect on yield
 - ▣ Aggressive approach for taller, later maturing varieties

Discussion



- Irrigation impacts on Yield
 - ▣ Irrigation made difference in Midsouth and Southwest
 - ▣ Rainfall in Southeast skewed results
- Variety selection CRUCIAL to maximize yields
 - ▣ Southwest- DP 1044B2RF and PHY 499WRF
 - ▣ Midsouth – PHY 499WRF
 - ▣ Southeast – DP1050B2RF and PHY 499WRF
- Variety response may depend on irrigation initiation

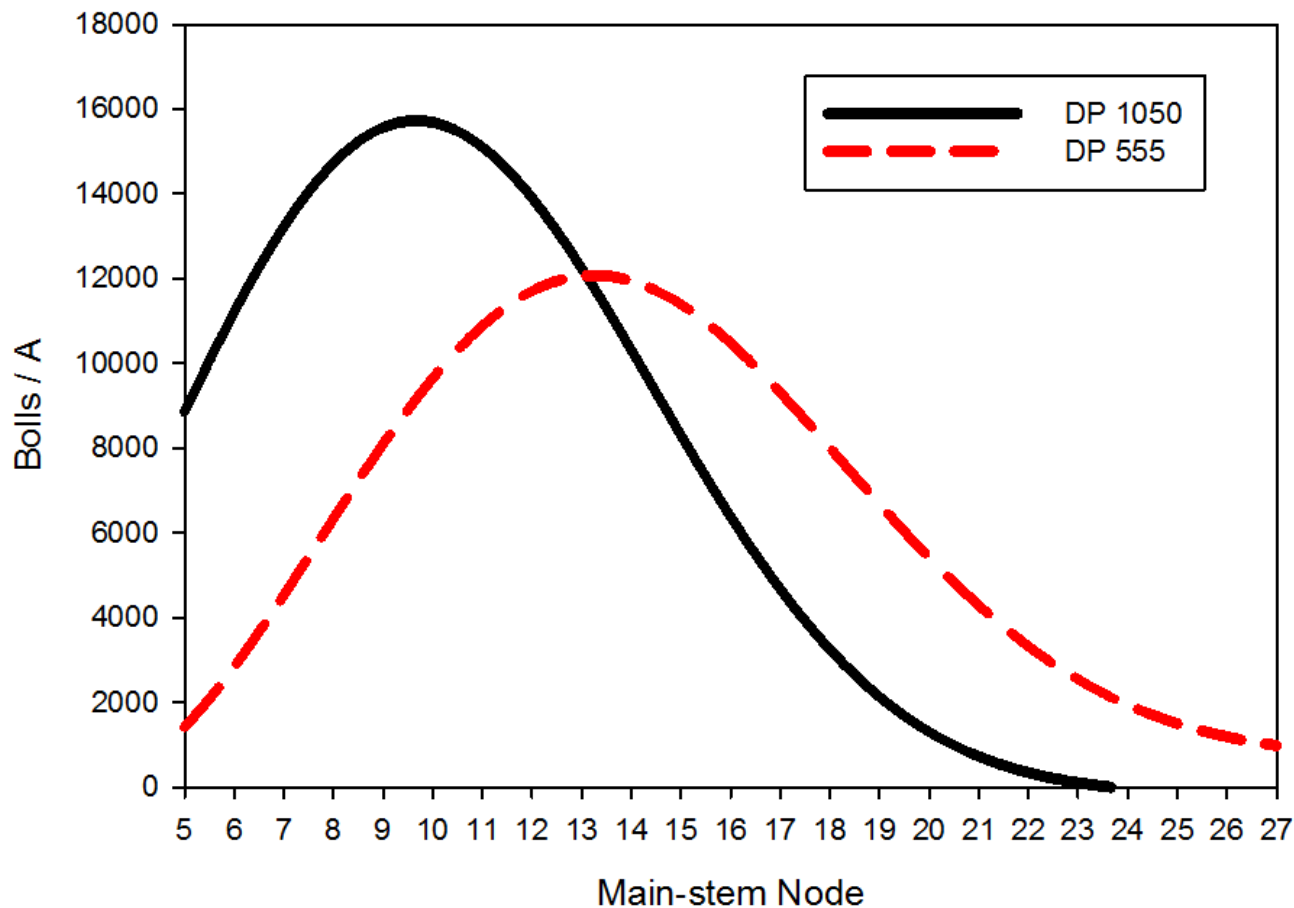
Lint Yield – Variety * Irrigation Treatment (averaged across locations - 2011)



- FM 1740 > DP 1050 = 40 cb, 70 cb, and 100%
- FM 1740 = DP 1050 = dryland, 65% UGA recs.

UGA Approach to PGR Management for New Cotton Varieties

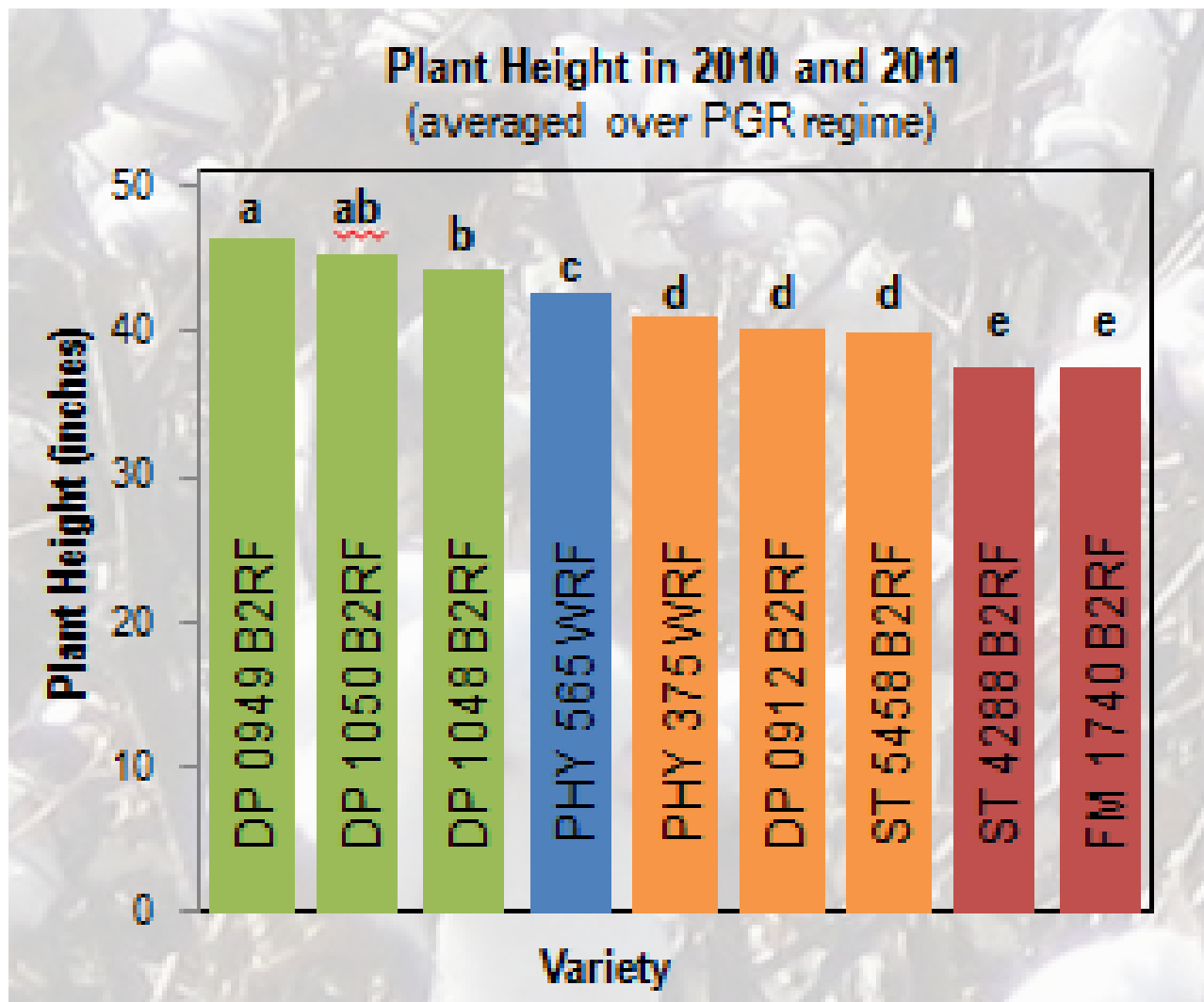
1st Position Boll Production
(2009 and 2010)





Avoid yield-limiting PGR applications

UGA Approach to PGR Management for New Cotton Varieties



Relative PGR Requirements of Cotton Varieties - 2014

(PGR REQUIRMENTS VARY – use only as guide)

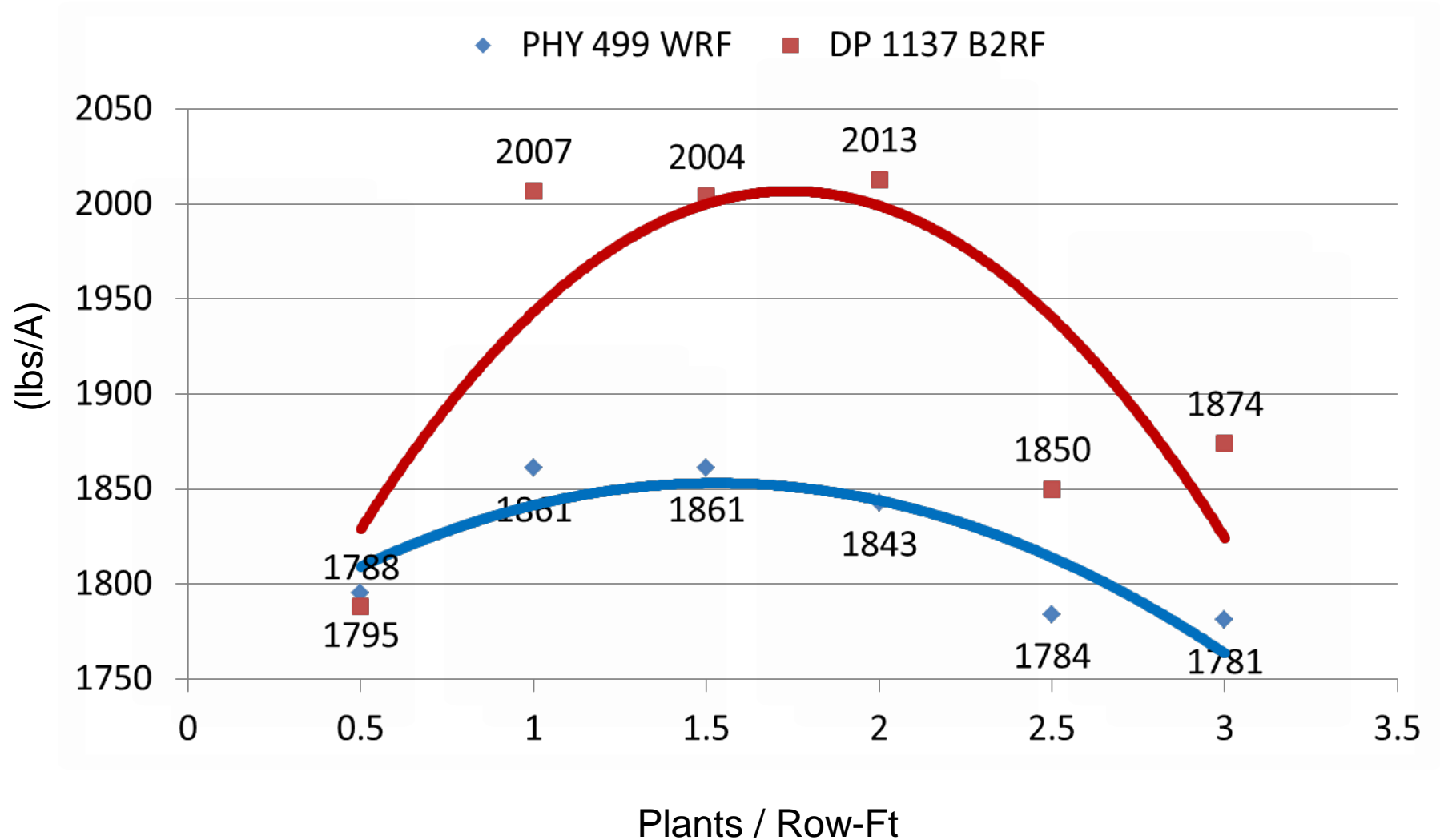
Classification		Varieties	PGR Recommendations
1	Varieties with the most vegetative growth potential, require intensive PGR management	<p>DP 0949 B2RF DP 1048 B2RF</p> <p>DP 1050 B2RF DP 1137 B2RF</p> <p>DP 1252 B2RF PHY 499 WRF</p> <p>PHY 339 WRF PHY 575 WRF</p>	<p>Applications - MULTIPLE</p> <p>Initiation - PRIOR TO BLOOM</p> <p>Product – MC (all applications, rates vary)</p>
2	Varieties with similar growth potential of 1 st class, yet more responsive to PGRs or earlier in maturity	<p>PHY 565 WRF ST 4145 LLB2</p> <p>ST 6448 GLB2 CG 3787 B2RF</p> <p>NG 5315 B2RF DG 2610 B2RF</p>	<p>Applications – MULTIPLE, MOST CASES</p> <p>Initiation – Squaring to 1st Bloom</p> <p>Product - 1st application - Stance or MC</p> <p style="padding-left: 40px;">- Sequential app. – MC only</p>
3	Varieties may require PGRs, but pre-bloom initiation not typically necessary, could result in premature cutout, esp. in dryland conditions	<p>AM 1511 B2RF DP 0912 B2RF</p> <p>PHY 375 WRF FM 1773 B2RF</p> <p>DP 1133 B2RF ST 5458 B2RF</p>	<p>Applications – ONE to MULTIPLE</p> <p>Initiation - Bloom initiation likely sufficient</p> <p>Product - 1st app. (Stance or MC, low rates)</p> <p style="padding-left: 40px;">- seq. applications - Stance or MC</p>
4	Varieties that may need no PGR applications, or almost always not applied prior to bloom	<p style="padding-left: 40px;">FM 1740 B2RF</p> <p>ST 4946 GLB2 FM 1944 B2RF</p> <p>FM 1845 LLB2 ST 4288 B2RF</p>	<p>Application – NONE to ONE</p> <p>Initiation - Bloom initiation almost always</p> <p>Product – Stance or MC (↓rates)</p>

Plant Populations & Seeding Rates

UGA RECOMMENDATIONS

- Aim for 2-3 plants per foot or row
- In 1995 to 1997 – FOR MAX YIELDS
 - Seeding rates as low as 2 / row-ft
 - OR 1.2 to 1.9 plants / row-ft
- WHAT ABOUT NEW VARIETIES?
- WHAT ABOUT 3 to 4 bale cotton?

Lint Yield Affected by Variety and Plant Population (2013 – Midville, GA)



Dryland Variety Trial Midville, GA; Planted 6-1-11

Planted into fair soil moisture 1" deep

Rainfall – 0.9" (5-27), 0.7" (6-3), 0.4" (6-16)

Pictures on 7-9-11

Variety 1

Variety 2

Variety 3

Variety 4

Variety 5

Variety 6

Variety 7

Seed Size and Effect on Emergence

Potential impact on seeding rate decisions
based on variety and environment

Southern Root-Knot Nematode Resistance

- A significant issue throughout GA and much of the SE.
- Loss of aldicarb impacted management
- New varieties with “resistance” have shown benefit in situations where problems are significant.
- However, resistant varieties have yet to be among top performing varieties.
- **NEED MORE INFORMATION TO MAKE PRACTICAL DECISIONS**



Conclusions

- Cotton performance is greatly affected by variety selection.
 - ▣ Make informed variety selection decisions.
- Management can impact performance
 - ▣ Seeding rate
 - ▣ Irrigation
 - ▣ PGRs
- Consider factors when making variety selection decisions and consider management strategy prior to planting.

Acknowledgements:

Cotton Incorporated

Cotton Specialist Working Group

