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

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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
  - April 25, 2013
  - 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

<table>
<thead>
<tr>
<th>Year</th>
<th>Southwest</th>
<th>MidSouth</th>
<th>Southeast</th>
</tr>
</thead>
<tbody>
<tr>
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<td>DP 1044 B2RF</td>
<td>DP 0912 B2RF</td>
<td>DP 1050 B2RF</td>
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<td>PHY 499 WRF</td>
<td>FM 1944 GLB2</td>
<td>FM 1944 GLB2</td>
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<td>PHY 565 WRF</td>
<td>PHY 499 WRF</td>
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<td>ST 5288 B2F</td>
<td>PHY 499 WRF</td>
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<td>FM 1944 GLB2</td>
<td>FM 1944 GLB2</td>
<td>DP 1252 B2RF</td>
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<td>NG 1511 B2RF</td>
<td>PHY 499 WRF</td>
<td>PHY 499 WRF</td>
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<tr>
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<td>PHYY 499 WRF</td>
<td>ST 5288 B2F</td>
<td>ST 6448 GLB2</td>
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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 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 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
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<tr>
<th>Year</th>
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</thead>
</table>
| 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  
PHY 499 WRF |
| 2013 | DP 1044 B2RF  
DP 1359 B2RF  
FM 1944 GLB2  
NG 1511 B2RF  
PHYY 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
Yields statistically reduced when PGR applications applied to FM 1944 GLB2
Other varieties not affected by PGR applications
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)

**2102**

- A: PHY499WRF
- A: DP1050B2RF
- B: FM1944GLB2
- B: PHY375WRF
- C: DP0912B2RF

**2103**

- A: DP1137B2RF
- AB: DP1252B2RF
- B: PHY499WRF
- B: ST6448GLB2
SOUTHEAST VARIETY EFFECTS 2012

Cotton Plant Height (in) / (node number)

- **FM1944BGL2**: HT 60: 35, FHT: 51, TN: 25, NUHB: 15
- **PHY375WRF**: HT 60: 37, FHT: 51, TN: 24, NUHB: 16
- **PHY499WRF**: HT 60: 40, FHT: 55, TN: 25, NUHB: 16
SOUTHEAST VARIETY EFFECTS 2013 – Plant Height

FL_2013
- DP1137B2RF: B
- DP1252B2RF: A
- PHY499WRF: B
- ST6448GLB2: B

GA_2013
- DP1137B2RF: AB
- DP1252B2RF: AB
- PHY499WRF: A
- ST6448GLB2: B
SOUTHEAST VARIETY EFFECTS 2013 – Total Nodes

DP1137B2RF  DP1252B2RF  PHY499WRF  ST6448GLB2

FL_2013  GA_2013

C  B  B  A
D  CD  AB  A
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
OTHER FACTORS: Irrigation Benefits

- Yield
- Stand Establishment
- Herbicide Activation
- Nitrogen Activation and nutrient movement
- Canopy Development
- Maintain Earliness
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
Avoid yield-limiting PGR applications
UGA Approach to PGR Management for New Cotton Varieties
### Relative PGR Requirements of Cotton Varieties - 2014

(PGR REQUIREMENTS VARY – use only as guide)

<table>
<thead>
<tr>
<th>Classification</th>
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<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>Varieties with the most vegetative growth potential, require intensive PGR management</td>
</tr>
<tr>
<td>DP 0949 B2RF</td>
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<tr>
<td>PHY 499 WRF</td>
</tr>
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<td>PHY 339 WRF</td>
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<tr>
<td>PHY 575 WRF</td>
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<tr>
<td><strong>Varieties</strong></td>
</tr>
<tr>
<td><strong>PGR Recommendations</strong></td>
</tr>
<tr>
<td>Applications - MULTIPLE</td>
</tr>
<tr>
<td>Initiation - PRIOR TO BLOOM</td>
</tr>
<tr>
<td>Product – MC (all applications, rates vary)</td>
</tr>
</tbody>
</table>

| 2 |
| Varieties with similar growth potential of 1st class, yet more responsive to PGRs or earlier in maturity |
| PHY 565 WRF |
| ST 6448 GLB2 |
| NG 5315 B2RF |
| ST 4145 LLB2 |
| CG 3787 B2RF |
| DG 2610 B2RF |
| **Varieties** |
| **PGR Recommendations** |
| Applications – MULTIPLE, MOST CASES |
| Initiation – Squaring to 1st Bloom |
| Product - 1st application - Stance or MC |
| - Sequential app. – MC only |

| 3 |
| Varieties may require PGRs, but pre-bloom initiation not typically necessary, could result in premature cutout, esp. in dryland conditions |
| AM 1511 B2RF |
| PHY 375 WRF |
| DP 1133 B2RF |
| **Varieties** |
| **PGR Recommendations** |
| Applications – ONE to MULTIPLE |
| Initiation - Bloom initiation likely sufficient |
| Product - 1st app. (Stance or MC, low rates) |
| - seq. applications - Stance or MC |

| 4 |
| Varieties that may need no PGR applications, or almost always not applied prior to bloom |
| FM 1740 B2RF |
| ST 4946 GLB2 |
| FM 1845 LLB2 |
| **Varieties** |
| **PGR Recommendations** |
| Application – NONE to ONE |
| Initiation - Bloom initiation almost always |
| Product – Stance or MC (↓ rates) |
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

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:
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