Conventional Cotton Varieties and Management of the Bollworm/Budworm Complex

R. G. Luttrell, Ryan Jackson, and Clint Allen
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**Cotton, rice, soybean yields climb higher**

By Elton Robinson
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*USDA forecasted higher average yields for cotton, rice and soybeans in its Oct. 11 Crop Production report, and lowered average yield for corn once again. Several Mid-South states are projecting record rice yield.*

U.S. rice production in 2012-13 is forecast at 398.9 million hundredweight, up
(See MID-SOUTH, Page 2)

**Conventional cotton variety promising**

By Elton Robinson
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*Are the stars aligning for a revival of conventional cotton varieties? They could be for producer Keith Mayberry, who farms around Essex, Mo. This season, he planted 200 acres of AM Ua48, a conventional variety developed by University of Arkansas plant breeder Fred Bourland and which was subsequently commercialized by Americot.*

The variety boasts some interesting fiber properties — a staple range of 39-41, which is solidly in the premium range, and strength of 34-35. As the season was coming to a close, yield potential was also very promising for Mayberry.

Mayberry farms about 800 acres of cotton, 1,000 acres of corn, and 1,200 acres of soybeans with his sister, Kim Mayberry-Hofeldt, a sales representative for BASF.*
Adoption of Bt Cotton in U.S. Cotton Belt
Average Number of Bollworm Sprays Per Acre
Components of 2011 & 2012 Studies

• Cotton Varieties
  – Early Maturity Lines
    • Bourland Variety (BVAR) – ARK48
    • Conventional (non Bt) Comparison – DP121
    • Bollgard 2 Comparison – DP0912
    • Widestrike Comparison – PHY375
  – Full Season Lines
    • Meredith Variety (MVAR) – MD25
    • Conventional (non Bt) Comparison – DP174
    • Bollgard 2 Comparison – DP1048
    • Widestrike Comparison – PHY499

• Insecticide Spray Options
  – Untreated
  – Sprayed with Karate (pyrethroid)
  – Sprayed with Prevathon (diamide)
Components of 2011 & 2012 Studies

• Cage Studies (1/8 acre)
  – Release of high densities of H. zea and H. virescens moths
  – 1 or 2 applications of Karate, Prevathon (Coragen)
  – Weekly plant maps, end-of-season box map

• Replicated Plot Studies – Stoneville
  – Split plot – untreated, Prevathon (Coragen), Karate sprays based on average scouting data for treatment and MSU larval thresholds

• On-Farm Comparisons
  – 4 locations in 2011, 10 locations in 2012
  – Same treatments as Cage and Replicated Plot studies, varieties varied to some extent, no ARK48 or MD25
2011 & 2012 Cage Studies

• Three 1/8 acre cages – each with seven varieties managed without insecticide, treated with Karate twice, treated with Coragen twice

• Cages infested three times (1st bloom, 1st bloom + 2 weeks, 1st bloom + 4 weeks) – 400 *H. zea* and 400 *H. virescens* released each time

• Plants mapped weekly for insect damage and fruit retention on first positions

• Plants box mapped at harvest for yield and maturity

• Data studied by AOV and yield plotted versus estimated time post cotyledon (assume 3 days for mainstem node expansion and 6 days for branch nodes)
Analysis of Variance

Response – Lint Yield Per Acre (Box Mapping of Cage Study)

<table>
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<th>Source</th>
<th>df</th>
<th>F ratio</th>
<th>Prob. &gt; F</th>
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<td>0.1206</td>
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<td>Variety * Insecticide</td>
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<td>1.4745</td>
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Lint Yield Per Acre – 2011 Value Added – Box Mapping of Cage Study

USDA, ARS Southern Insect Management Research Unit
Stoneville, Mississippi

Graph showing yield comparisons between different treatments.

Treatments: Untreated, Karate, Coragen

Varieties: ARK 48 (BVAR), DP121 (BCONV), DP0912 (BBG2), PHY375 (BWS), MD 25 (MVAR), DP174 (MCONV), DP1048 (MBG2)
Summary

• Under conditions of extreme insect damage, unsprayed non-Bt did not produce economic yield. No yield in some instances.

• No difference observed among varieties in yield when treated with Coragen.

• Yields of most varieties treated with Karate were statistically similar to those treated with Coragen, except for PHY375.
Summary

• Coragen treated non Bt cottons (ARK 48, DP121, MD25, and DP174) were as good as or better than some untreated Bt cottons.
• First year results suggest that high yielding non Bt cottons can be protected from extreme insect pressure if managed correctly.
• Additional work needed to refine estimates of damage rates and repeatability of first year observation.
Total Bolls Counted on Plant Maps on August 15

Release 200 zea and 200 virecens/cage on 7/18 and 7/24
Spray 1st time on 7/24, Spray 2nd time on 8/2
Plant Map – Cage Study
August 15, 2012

Bolls/Plant
Untreated

Bolls/Plant
1 Spray Karate

Bolls/Plant
2 Sprays Karate
Plant Map – Cage Study
August 15, 2012

Bolls/Plant
Untreated

Bolls/Plant
1 Spray Prevathon

Bolls/Plant
2 Sprays Prevathon
Plant Map – Cage Study
August 15, 2012

Bolls/Plant
Untreated

Bolls/Plant
1 Spray Prevathon

Bolls/Plant
2 Sprays Karate
Yield (lb lint/acre)

No. Sprays

Returns Above Lepidoptera Control
($0.70 cotton -- 2011)

Estimated Lepidoptera Control Costs/Acre
Bt Technology Fee -- $20.25
Karate + Application -- $11.00
Prevathon + Application -- $37.75

Ryan Jackson Plot Study
Stoneville, Mississippi
2011
Ryan Jackson Plot Study
Stoneville, Mississippi
2012

Returns Above Insect Control
($0.70 cotton -- 2012)

Estimated Lepidoptera Control Costs/Acre
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Returns Above Lepidoptera Control
($0.70 cotton -- 2012)
### Ranked Yield Response

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<td>10.6</td>
<td>13.0</td>
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</tr>
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*Interactions must be considered.*

*Different environments require different combinations of insect management options.*
• Bt technologies provide economic control of Lepidoptera.
• Options for managing Lepidoptera include new insecticides (Prevathon) and high yielding non-Bt varieties.
• Spraying Bt cotton may be cost effective. Choice of insecticide and efficient management depends upon a knowledge of the abundance and types of insect pests present.
• Under some situations early maturing varieties avoid late season insect damage.
• Controlling bollworm/tobacco budworm is important when damaging densities are present.
• Damaging densities are not always present.