Perspectives on Cotton Seed Size in Cotton Varieties

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Outline

// Where is the most value in the seedcotton going through the gin?

// What are the yield components that are driving yield in cotton?
  // Have these yield components changed?

// How should the industry respond?

// Trends from the NCVT
  // Lint Percent
  // Seed Index

// Yield Components in Bourland
// OVT Data
  // Seed per acre
  // Lint percent
  // Fiber / seed
  // Fiber / seed surface area
Note: assuming a standard trash level across all turnout levels

Estimated Pounds of Fuzzy Cottonseed per bale

~10 - 15% reduction in amount of cottonseed per bale with increasing gin turnout (lint percent)
Fiber accounts for 85 to 87% of the value of the cotton crop each year.

Source: https://quickstats.nass.usda.gov (Cotton & Cottonseed Production measured in $ / year)
Lint percent trends – 1993-2016

NCVT - Eastern Region and Delta Region

\[ y = 0.1922x - 345.01 \]

Source: https://www.ars.usda.gov/southeast-area/stoneville-ms/crop-genetics-research/docs/national-cotton-variety-test/
Seed index trends: 1993-2016
National Cotton Variety Test

Seed Index Trends 1993 - 2016
Eastern and Delta Regions - NCVT

y = 0.0068x^2 - 27.09x + 27181
R^2 = 0.2909

Source: https://www.ars.usda.gov/southeast-area/stoneville-ms/crop-genetics-research/docs/national-cotton-variety-test/
Yield components vs. Lint Yield

University of AR OVT Data – 2017-2018

2017 Summary across 5 locations

- Seed per acre
  - #1 yielding variety with #1 seed per acre
- Fiber Density
  - #2 yielding variety with #1 fiber density

2018 Summary across 5 locations

- #1 yielding variety
  - #3 in fiber density
  - #3 in # seeds per acre
- #2 yield variety
  - #1 in # seeds per acre

Analysis on the following yield components

- Fiber Density & Fiber per seed
- # Seeds per Acre
- Seed Index
- Lint Index
- Lint Fraction

Data Sources:
Yield Components (# Seed per Acre) vs. Lint Yield
University of Arkansas - 2017

Data Sources:
Yield Components (Fiber Density) vs. Lint Yield

University of Arkansas - 2017

Data Sources:
Lint Percent vs. Lint Yield
AR OVT 2017 & 2018

Data Sources:
Yield Components vs. Lint Yield
University of Arkansas - 2017

Data Sources:
Yield Components vs. Lint Yield
University of Arkansas - 2017

Data Sources:
Yield Components (Seed Index) vs. Lint Yield

AR OVT – 2017 & 2018

Data Sources:
Fiber Density and Seed Index vs. Lint Percent

Data Source:
Summary Comments from Yield Components
AR OVT – 2017-2018

// Highest R-squared for Yield components vs. Lint Yield
  // # Seed per acre
  // R-squared = 0.498 to 0.517
  // Highly significant both years
  // Fiber Density (# fibers / sq. mm)
  // R-squared = 0.125 to 0.302
  // Significant both years
  // Lint Percent
  // R-squared = 0.245 to 0.251
  // Significant both years

// Challenge: to Select “High Yield” Components with seed size (index) in good range for environment

// Lower R-squared for Yield Components vs. Lint Yield
  // Fibers per Seed
  // R-squared =0.02 to 0.17
  // Significant one of two years
  // Seed Index
  // R-squared =0.05 to 0.09
  // Significant one of two years
  // Lint Index
  // R-squared = 0.02 to 0.08
  // No significant relationship
Deltapine® variety perspective
Polynomial function (cubic) fits fiber length trend
Average Seed per pound (Commercial lots)

Source: Internal Bayer data of all commercial lots during life cycle of variety
Seed Size Trends in Deltapine Commercialized Varieties vs. Pre-commercial lines

Note: Plot seed lots, only AZ origin lots

Trend toward larger seeded Varieties in the nearby pipeline
Summary Comments -

// Fiber Value is ~ 7x Seed Value in most years
// Cotton fiber is 85 to 87% of the harvested value (seed + fiber) based on the trend analysis over the past 70 years.

// Seed size and lint yield components should be considered independently in this discussion
// Within-boll yield components should be utilized to drive yield (fiber per seed or fiber per seed surface area) and maintain or increase seed size

// Do we have a new paradigm?
// Continued fiber yield increases from genetic gain and management improvements (assuming seed yield stays flat) could require growers to pay for ginning above seed value
// Since fiber is 6 to 7 times greater value than fuzzy seed, the fiber yield increases will more than pay for the ginning costs
// Minimum seed size for emergence should maintain a seed that can be ginned similar to current standards.
Thank You!

Q&A
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