The Impact of Irrigation and Nitrogen Rate on Yield and Fiber Quality of Determinate and Indeterminate Cotton Cultivars

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Introduction

Optimizing irrigation quantity and timing at each growth stage is essential to maximizing cotton lint yield and preventing poor fiber quality.

Furthermore, yield and fiber quality responses to nitrogen (N) rate and irrigation regimes are hypothesized to vary by cultivar, especially between cultivars of varying maturities and determinacies.

The field trial design:

- Trial design was a split-split-plot with four replicates.

Materials and Methods

Two cotton cultivars:

- PHY 367 WRF (early determinate)
- PHY 499 WRF (late indeterminate)

Were subjected to six sub-surface drip irrigation regimes:

- Rainfed
- 0.5” water per week at mid-square
- 0.5-1.5” per week during late bloom
- 1.0-1.5” per week during late bloom

Two N rates:

- 80 lb N/ac
- 120 lb N/ac

Results

- The response of lint yield and fiber quality to N rate, irrigation regime and cultivar varied in each of three years due to different rainfall amounts.
- During 2012 and 2013, PHY 499 WRF significantly out-yielded PHY 367 WRF.
- Also, in 2012, the 0.5”/wk mid-squaring-1.5”/wk late bloom irrigation regime significantly out-yielded the rainfed treatment.
- However, excessive amounts of rainfall relative to the 30 year normal trends for the location during 2013 and 2014 resulted in no significant yield or fiber quality differences associated with irrigation regimes.

Discussion

However, there was no consistency found in interaction between irrigation regime, N rate and cultivar that impacted yield and fiber quality among the three years of study.

Additional research should be conducted to investigate this irrigation system and interactions during more normal-rainfall years.

References

- Subsurface drip irrigation by Netafim https://www.youtube.com/watch?v=8l_k_qy722U.