

COTTON GROWTH, LINT YIELD, AND FIBER QUALITY AS INFLUENCED BY SEEDING RATES UNDER DRYLAND AND IRRIGATION IN THE ROLLING PLAINS OF TEXAS

E. Kimura

J.H. Ramirez

C. Adams

S. Thapa

P. DeLaune

**Texas A&M AgriLife Research and Extension
Vernon, TX**

Abstract

Best Management Practices for newer cotton (*Gossypium hirsutum* L.) varieties have not been updated in the Rolling Plains of Texas; therefore, seeding rate of cotton variety was evaluated under irrigation and dryland condition. Cotton variety, PHY 333 WRF, was planted into 4 rows by 40-inch row spacing for at least 150 ft in length under irrigated and dryland conditions. Treatments included four seeding rate at 1.7, 3.4, 4.4, and 5.6 seeds ft⁻¹. The study was designed as a randomized complete block design with 4 replications. Cotton plants reached maturity earlier with higher seeding rates than lower seeding rates based on weekly measurements on node above white flower. Estimated average lint yields at 30% turnout were 1139, 1214, 1336, and 1308 lb ac⁻¹ under irrigation and 724, 740, 813, and 717 lb ac⁻¹ under dryland at 1.7, 3.4, 4.4, and 5.6 seeds ft⁻¹ respectively. Yield was numerically higher at seeding rate of 4.4 seeds ft⁻¹ in irrigated and dryland cotton.

Introduction and objectives

Advanced cotton cultivars are released every year with new technologies for weed and pest control; however, best management practices (BMPs) for cotton have not been updated years in the Rolling Plains of Texas. Therefore, traditional agronomic practices need to be reevaluated for advanced technologies and commercial cotton varieties to determine BMPs under current environmental and economic conditions. The objective of the study is to investigate seeding rates of a modern cotton variety, to maintain yield and minimize input cost under irrigation and dryland conditions.

Materials and methods

The study was established at Texas A&M Chillicothe Research Station at Chillicothe, TX on June 9th, 2016. Cotton variety 'PHY 333 WRF' was planted into 4 rows by 40-inch row spacing for at least 150 ft in length under irrigated and dryland conditions. Treatments included four seeding rate at 1.7, 3.4, 4.4, and 5.6 seeds ft⁻¹. The study was designed as a randomized complete block design with 4 replications. The plot was harvested on October 28. Data presented here include stand count on DAP 12, node above white flower or NAWF (weekly), stalk diameter (biweekly), and lint yield estimated with 30% turn out. Data were subjected to Analysis of Variance and means were separated using Fisher's Protected LSD ($P \leq 0.05$).

Results and discussion

Lower stand counts were observed for 4.4 and 5.6 seeds ft⁻¹ treatments expected in both irrigated and dryland likely due to the high competition under the high seeding rates (Fig. 1). Stalk diameter was in the range of 0.001-0.005 and 0.001-0.002 inch thicker on seeding rate at 1.7 seeds ft⁻¹ compared to the rest of seeding rates under irrigation and dryland, respectively (Fig. 2). Cotton reached cutout (NAWF = 5) at similar timing among 3.4, 4.4, and 5.6 seeds ft⁻¹, while cotton reached cutout a few days later at 1.7 seeds ft⁻¹ under irrigation (Fig. 3). In dryland, seeding rate at 5.6 seeds ft⁻¹ reached cutout earliest, followed by 3.4 and 4.4, and 1.7 seeds ft⁻¹. Dryland reached cutout approximately 15-20 days earlier than irrigated cotton. Average lint yields were 1249 and 748 lb ac⁻¹ at irrigated and dryland, respectively (Fig. 4). Lint yield was numerically highest at 4.4 seeds ft⁻¹ in both irrigated and dryland cotton ($P > 0.5$).

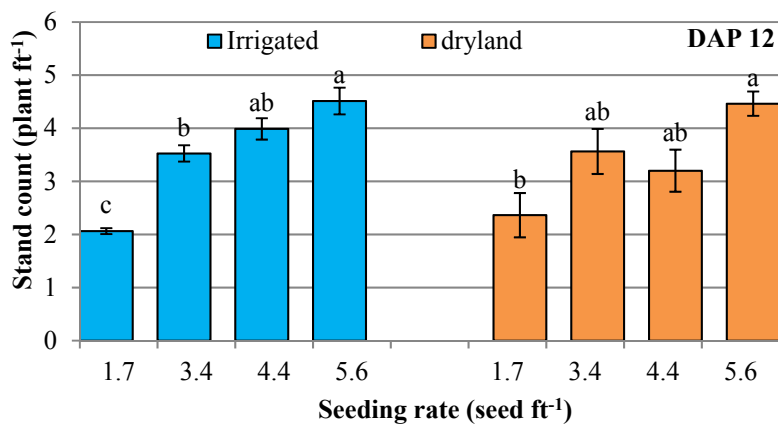


Figure 1. Stand count at DAP 12

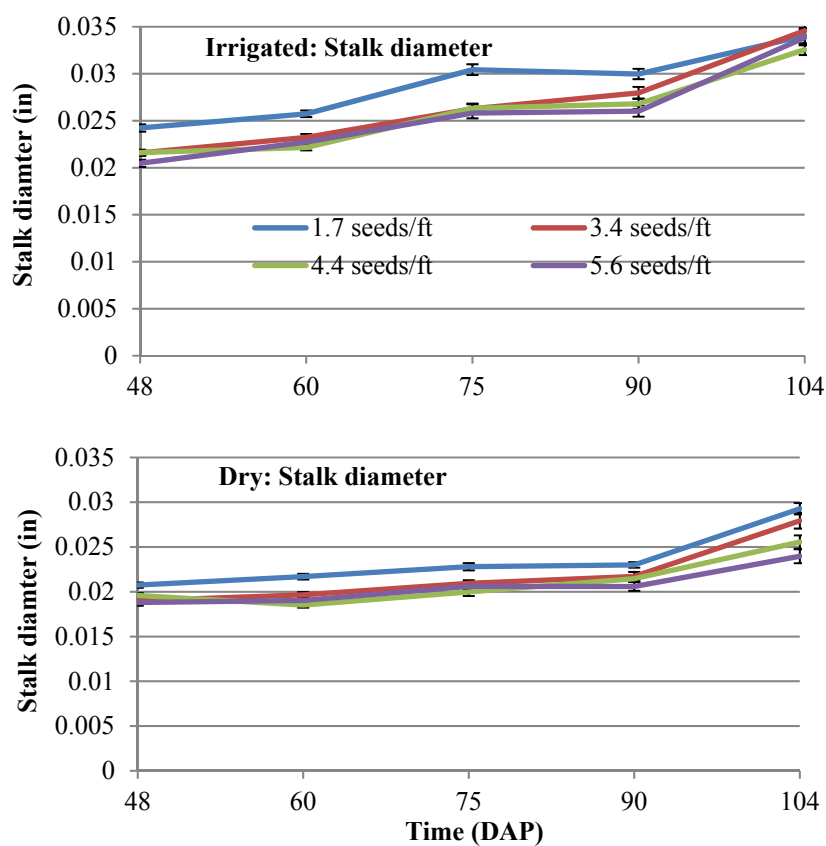


Figure 2. Stalk diameter of cotton seedlings under irrigation (top) and dryland (bottom)

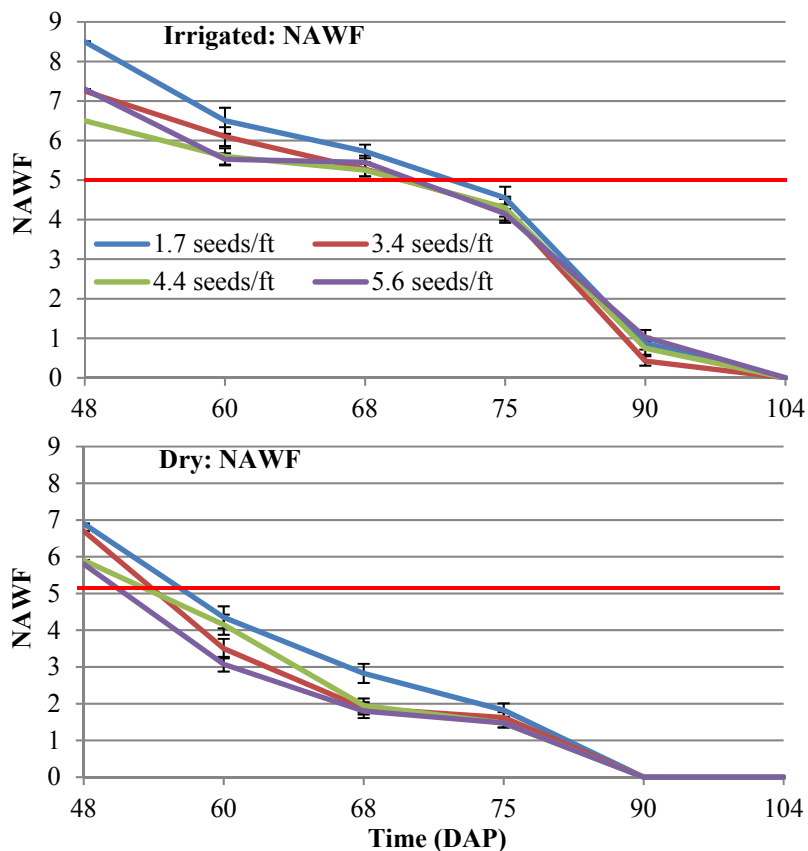


Figure 3. Node above white flower (NAWF) under irrigation (top) and dryland (bottom). Red line indicates cutout at NAWF = 5.

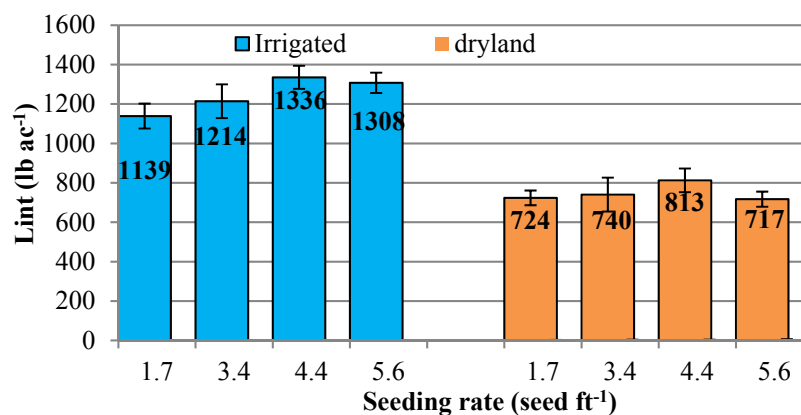


Figure 4. Lint yield under irrigated and dryland cotton. Lint yield was estimated with turnout at 30%.

Conclusion

Cotton growth and lint yield were investigated under four different seeding rates in irrigated and dryland conditions in the Rolling Plains of Texas. Cotton plants reached maturity earlier with higher seeding rates, especially under

dryland condition. Although no statistical differences were observed on lint yield among treatments, lint yield was numerically higher at seeding rate of 4.4 seeds ft⁻¹ in irrigated and dryland cotton. Fiber quality will be estimated from samples obtained from the study, which may further clarify the yield differences among treatments. Economic analyses will be conducted in the data following the final year of the trial.

Acknowledgement

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