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

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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, Phytogen 333WRF, 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. Yield and fiber quality will be discussed in the poster.

Introduction and objectives

Advanced cotton (*Gossypium hirsutum* L.) 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 9 June 2016 and 8 June 2017. Cotton variety 'Phytogen333WRF' 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 (22,216 ac^{-1}), 3.4 (44,431 ac^{-1}), 4.4 (57,499 ac^{-1}), and 5.6 seeds ft^{-1} (73,181 ac^{-1}). The study was designed as a randomized complete block design with 4 replications. The plot was harvested on 28 November 2016 and 17 November 2017. Data presented include stand count on DAP 12, node above white flower or NAWF (weekly), stalk diameter (biweekly), lint yield, and economic analysis of data obtained in 2016. Data were subjected to Analysis of Variance with SAS. Year and replication were treated as a random effect, while the seeding rate was treated as a fixed effect.

Results and Discussion

Emerged seedlings were 80% of planted seeds for 4.4 and 5.6 seeds ft^{-1} treatments in both irrigated and dryland trials likely due to the high competition under the high seeding rates (Fig. 1). Cotton reached cutout (NAWF = 5) at 60 DAP in irrigated and 50-55 DAP in dryland trial (Fig. 2). In dryland trial, seeding rate at 5.6 seeds ft^{-1} reached cutout earliest, followed by 3.4 and 4.4, and 1.7 seeds ft^{-1}. Stalk diameter was 0.02-0.08 and 0.02-0.05 inch thicker on seeding rate at 1.7 seeds ft^{-1} compared to the 5.6 seeds ft^{-1} in irrigation and dryland, respectively (Fig. 2). The difference was more obvious in dryland trial than irrigated trial. Little differences among treatment were observed in height and node count (data not shown). Lint yields averaged over two years in irrigated and dryland trials were 985 and 690, 1076 and 718, 1103 and 742, and 1114 and 690 lb ac^{-1} for 1.7, 3.4, 4.4, and 5.6 seeds ft^{-1}, respectively. Average turnout was 28% with use of a stripper without bur extractor. Regardless of the differences among in-season growth characteristics (e.g., NAWF and stalk diameter), no differences were observed in lint yield and turnout (Fig. 4). Based on the lint yield, loan value, and seed cost obtained from 2016 trial, economic analysis was conducted (Table 1). No differences were observed on net \$ ac^{-1} among all seeding rates examined.

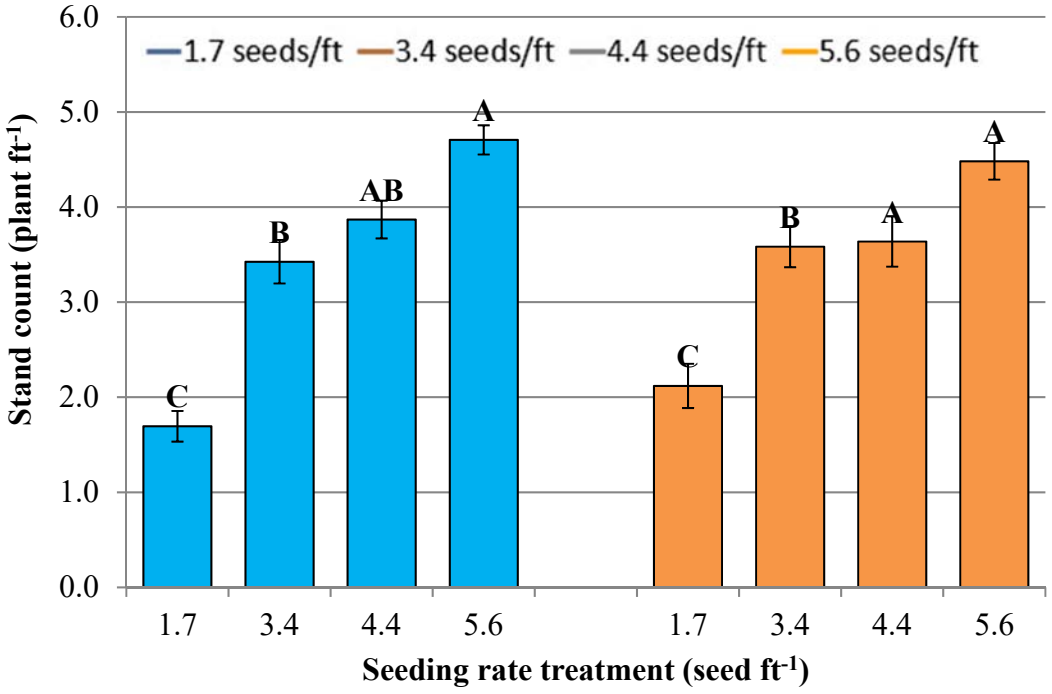

Figure 1. Stand count at DAP 12 for irrigated (left) and dryland (right) trials.

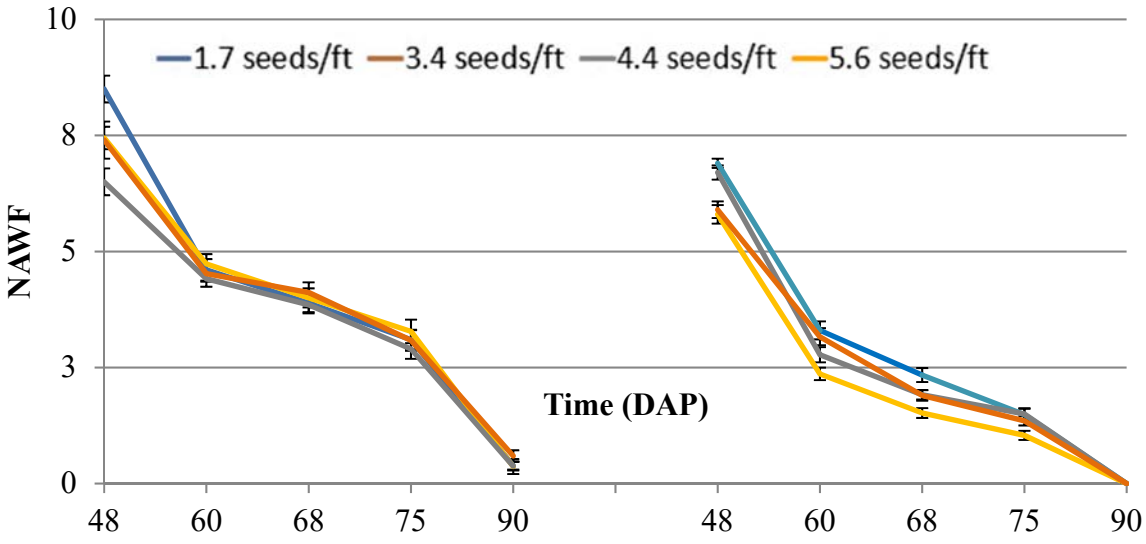

Figure 2. Node Above White Flower (NAWF) on irrigated (left) and dryland (right) trials.

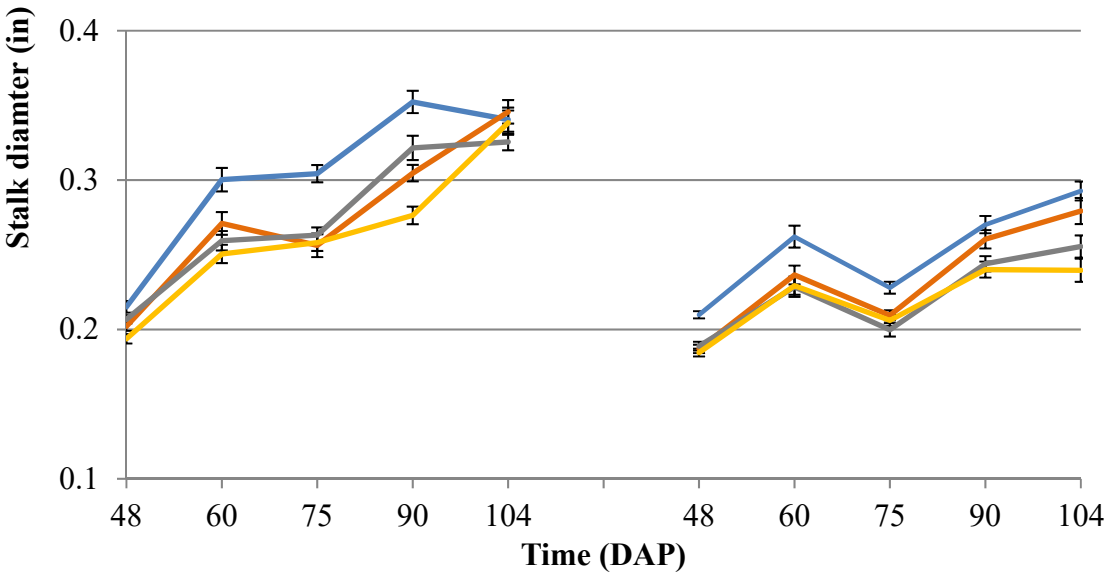

Figure 3. Stalk diameter on irrigated (left) and dryland (right) trials.

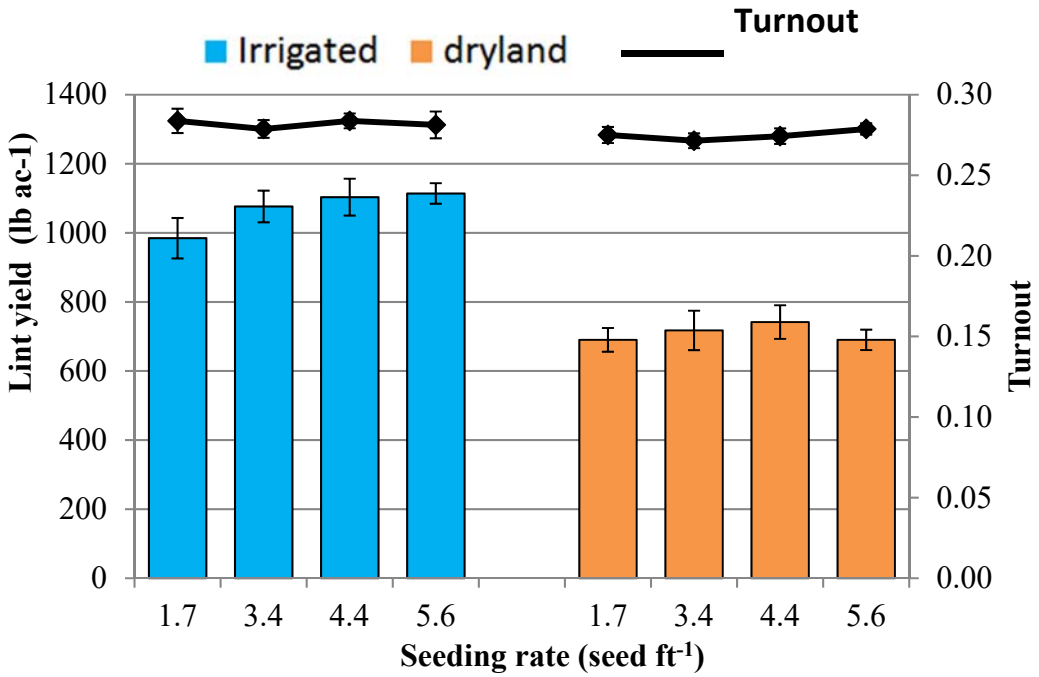

Figure 4. Lint yield under irrigated (left) and dryland (right) trials. Lint yield was estimated with turnout at 30%.

Table 1. Economic analysis of 2016 values

	Irrigated		Dryland	
Seeds ft^{-1}	**\$ ac^{-1*}**	**Net \$ ac$^{-1\#}$**	**\$ ac^{-1}**	**Net \$ ac^{-1}**
1.7	624	608	371	355
3.4	628	597	318	287
4.4	682	641	433	391
5.6	660	607	370	317
P	NS	NS	0.1481	0.1407

*\$ ac^{-1} was calculated based on loan values
#Net \$ ac^{-1} = \$ ac^{-1}-Seed cost
Assumptions: Seed cost at \$350/bag, one bag contains 230,000 seeds
No management costs were included in the analyses.

Conclusion

Cotton growth and lint yield were investigated under four different seeding rates in irrigated and dryland conditions in the Rolling Plains of Texas. The 4.4 seeds ft^{-1} in both irrigated and dryland trials achieved numerically the highest net profit although data were not significant ($P > 0.05$). Complete economic analyses will be conducted with fiber quality from 2017 samples.

Acknowledgement

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