EFFECT OF PLANTING DATES, COTTON VARIETIES AND SEEDING RATES ON LINT YIELD AND FIBER QUALITY

E. Kimura
J.H. Ramirez
D.R. Leija
P.B. DeLaune
Texas A&M AgriLife Research and Extension
Vernon, TX

Abstract

In Texas Rolling Plains, planting window for cotton is during May to mid-June. However, it seems that sufficient heat unit accumulation cannot be achieved if planting was conducted in June due to low heat unit accumulation in September and early freeze in mid-October. To answer questions received from the Texas Rolling Plains cotton growers in regard to the change in climates in the region, this study was designed. The study was conducted at the Texas A&M AgriLife Research and Extension center at Chillicothe, TX. The study was laid out as a randomized complete block design with 3 replications. Treatments includes varieties, planting dates, and seeding rates. PHY 250 W3FE, PHY 480 W3FE, and PHY 500 W3FE represent early, medium, and full maturing varieties, respectively. Initially, planting dates included end of April, mid-May, mid-June, and early-July; however, due to the prolonged wet field conditions, we were unable to plant in April. Planting includes May 27, June 14, and July 15. Plots were planted to 5 seeds ft^{-1} and thinned to 1, 2, and 3 seeds ft^{-1} for dryland irrigated (in-furrow) trials.

Introduction and objectives

In Texas Rolling Plains, planting window for cotton is during May to mid-June. However, it seems that sufficient heat unit accumulation cannot be achieved if planting was conducted in June due to low heat unit accumulation in September and early freeze in mid-October. To answer questions received from the Texas Rolling Plains cotton growers in regard to the change in climates in the region, this study was designed. The study investigate the effect of planting dates, cotton varieties with different maturity levels, and seeding rates on lint yield and fiber quality.

Materials and methods

The study was conducted at the Texas A&M AgriLife Research and Extension center at Chillicothe, TX in 2021. The study was laid out as a randomized complete block design with 3 replications in in-furrow irrigated and dryland conditions. Treatments includes planting dates, varieties, and seeding rates. Planting dates are early-May, mid-May, early-June (5/27), mid-June (6/14), early-July, and mid-July (7/15). However, due to the prolonged wet field condition in May to early June (Fig. 1), we were able to plant the previously mentioned three dates. PHY 250 W3FE, PHY 480 W3FE, and PHY 500 W3FE represent early, medium, and full maturing varieties, respectively. Plots were planted to 5 seeds ft^{-1} and thinned to 1, 2, and 3 seeds ft^{-1} for dryland and irrigated trials. The trial was harvested with two-row stripper on November 15, 2021. Analysis of variance (ANOVA) was conducted using proc Mixed of SAS.

Results and Discussion

Total water received for the 5/27, 6/14, and 7/15 plantings were15.5", 12.4" and 5.7" for the dryland trial and 22.3", 19.2", and 12.6" for irrigated trial, respectively. July planting is not common practice in the Texas Rolling Plains and considered "too late". As shown in the Fig. 1, heat unit accumulation and total water received for the 7/15 planting was low for optimal lint production. Among the three main effects, planting dates significantly influenced the most of response variables for both dryland and irrigated trials (Table 1 and 2). The 5/27 and 6/14 plantings provided significantly greater yields than 7/15 planting, where no significant difference was observed between the two plantings in the dryland trial. For the irrigated trial, 6/14 yielded the greatest, followed by 5/27 and 7/15 (Table 2). This may be because 2021 was wetter than normal year without an early freeze, which allowed the 6/14 planting trial to accumulate enough heat unit before defoliation. However, the two weeks between 5/27 and 6/14 can be detrimental in the year of early-freeze. Variety with different maturity levels played significant role on determining the yield on dryland and irrigated trials (p <.0001), while the effects of seeding rates were insignificant (Table 1). Medium maturing variety performed best on lint yields regardless of the planting timings and seeding rates, except for 7/15 planting in irrigated trial (Fig. 2).

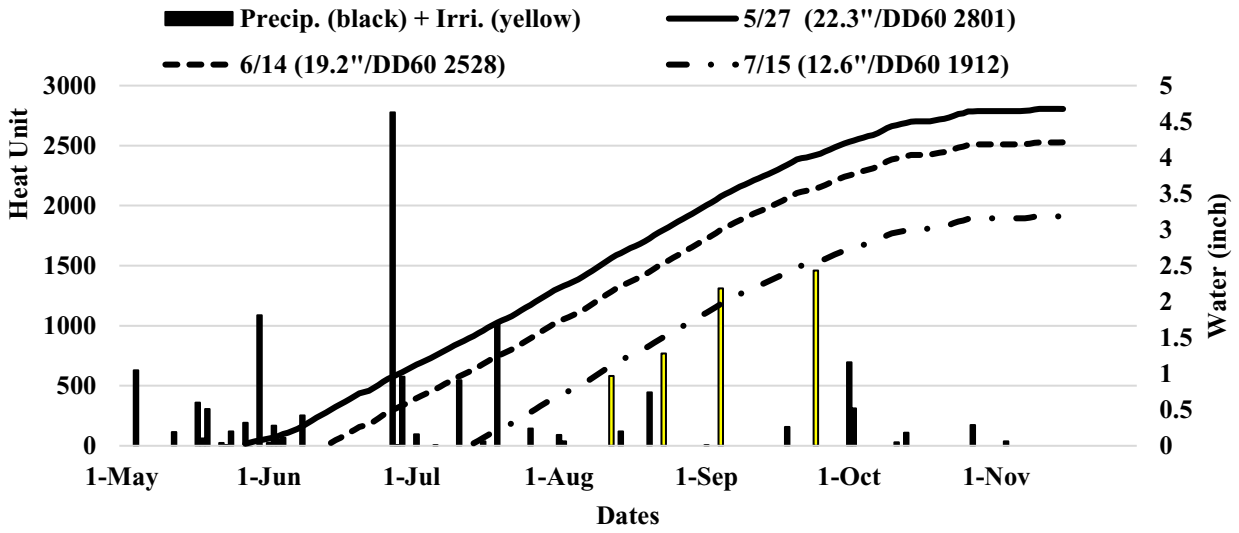

Fig. 1. Accumulated heat unit, precipitation (Black) and irrigation water (yellow).

Table 1. ANOVA table. ***, **, and * indicate $p < 0.0001$, 0.001, and 0.05, respectively.

	Lint yield	Turnout	Mic.	Length	Strength	Unif.	Loan	$ ac^{-1}
				Dryland				
Dates (D)	***	*	***	***	NS	NS	***	***
Variety (V)	***	NS	NS	NS	NS	***	NS	*
Rates (R)	NS	NS	NS	NS	NS	NS	NS	NS
DV	NS	NS	***	NS	NS	NS	NS	NS
DR	NS	NS	NS	NS	NS	*	NS	NS
VR	NS	NS	NS	NS	NS	NS	NS	NS
DVR	NS	NS	NS	NS	NS	NS	NS	NS
				Irrigated				
Dates	***	***	***	***	***	***	***	***
Variety	***	NS	NS	NS	*	*	NS	NS
Rates	NS	NS	***	NS	NS	NS	NS	NS
DV	*	*	*	NS	***	NS	*	NS
DR	NS	NS	*	*	NS	NS	NS	NS
VR	NS	NS	NS	NS	NS	NS	NS	NS
DVR	NS	NS	NS	NS	NS	NS	*	NS

Table 2. Average values for the main effect of dates for response variables

	Lint yield	Turnout	Mic.	Length	Strength	Unif.	Loan	$ ac^{-1}
				Dryland				
May 27	339 A	25 A	3.6 B	1.0 B	28.3	79.9	47.5 A	161 A
June 14	357 A	25 A	4.1 A	1.0 C	28.4	80.1	48.6 A	174 A
Jul 15	35 C	19 B	2.8 C	1.0 A	28.0	80.0	40.6 C	14 B
				Irrigated				
May 27	547 B	22 A	4.2 A	1.1 B	32.8 B	82.2 B	53.1 A	290 B
June 14	831 A	22 A	3.8 B	1.1 A	34.0 A	82.8 A	54.5 A	452 A
Jul 15	63 C	12 B	2.4 C	1.1 B	28.9 C	81.1 C	36.5 B	23 C

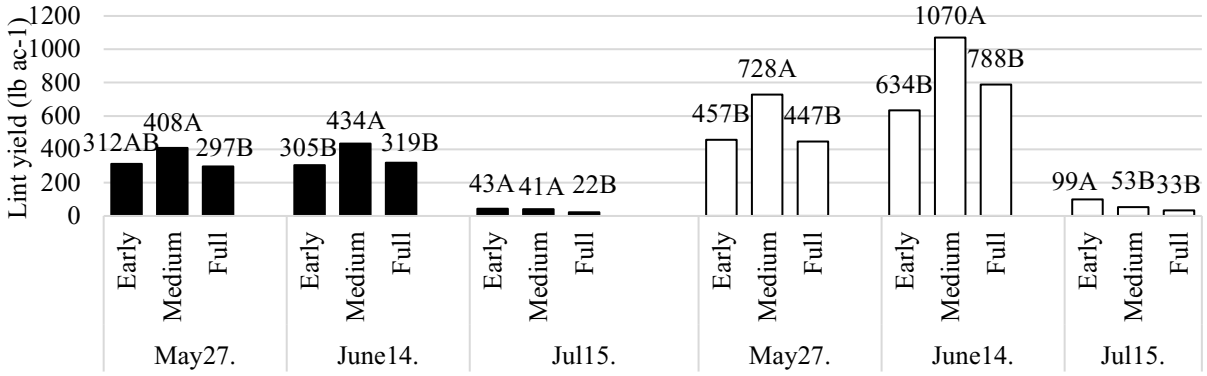

Fig. 2. Lint yield for dryland (black) and irrigated (white) trials. The same capital letters within a date are not significantly different at $p > 0.05$.

Conclusion

The study was conducted to determine the effects of planting dates, cotton varieties with different maturity levels, and seeding rates on lint yield and fiber quality. The preliminary results from the first-year study indicates that ***medium maturing variety performs best regardless of the seeding rates when planted in June.*** The study will be repeated with more planting dates in 2022 to further investigate the treatment combinations in the Texas Rolling Plains.

Acknowledgement

These projects were supported with funding from The Texas State Support Committee - Cotton Incorporated and Phytogen Cottonseed. We appreciate Joseph Ramirez for the field operations for the project.