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Full Length Review Article

INFLUENCE OF SEASON ON YIELD AND YIELD COMPONENTS IN COTTON

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Field trials were conducted for two seasons to find out the effect of season on field performance in cotton. Six genotypes were grown in two seasons *viz.,* summer and winter without pre-sowing treatment to identify the seasonal effect on yield and yield components in cotton. Prolonged vegetative period with delayed flowering was observed in summer while winter showing early flowering. Among the different traits studied, most of the traits exhibited variation except plant height. The genotype LRA 5166 exhibited higher seed cotton yield, boll weight, number of bolls followed by genotype surabhi. The genotype DHY 286-1 adversely affected by unfavourable environment condition yield and showing poor yield and yield contributing characters.

Key words: Cotton, Season, Yield.

INTRODUCTION

Cotton is an important commercial crops in India. It has a prominent share in our national economy. The indeterminate nature of the cotton crop throws up many intricacies in respect of growth and developmental events interms of varied expression influenced considerably by the biotic as well as abiotic factors. The season affecting the crop growth and yield. In general growing season and genotypes cultivated are very crucial to obtain maximum yield over a region depend upon its climate. Considering these facts the above study was designed to evaluate the performance of cotton genotypes under summer and winter season.

MATERIALS AND METHODS

The experimental material, for the present study comprised of six genotypes namely LRA5166, MCU 7, DHY 286-1, Surabhi, LRK 516 and AK 32. The trials were conducted in randomized block design at Experimental Farm, Department of Genetics and Plant Breeding in Faculty of Agriculture, Annamalai University. The simulated field experiments were conducted in two replication in both summer and winter season. Observations were recorded for field emergence percentage, speed of germination, days to first flower, plant height, number of bolls per plant, boll weight, number of seeds per boll, weight of seeds per boll, seed cotton yield on five randomly selected plants from each genotype in both the season. The data so collected were subjected to statistical analysis as per the method suggested by panes and Sukhatme (1984).

RESULTS AND DISCUSSION

In the present experiment, in summer season the cotton genotypes *viz.,* LRA5166 and surabhi recorded significantly higher value for speed of germination and germination percentage (2.58, 83%) and (2.35, 80%) respectively followed by AK 32 (2.05, 75%). The genotype AK 32 recorded higher value for speed of germination (2.05) while low germination percentage (75%) and MCU 7 recorded lower value for speed of germination (1.78) mean while higher germination percentage (79.00) when compare to winter sown cotton. Planting during winter prolonged vegetative growth with delayed flowering (58.67). The genotypes DHY 286-1 (58.67) and LRA5166 (41.67) planting during winter exhibited prolonged vegetative growth with delayed flowering compare to summer. In general, most of the other genotypes recorded early flowering when compared to winter sown genotypes. The plant height in all the varieties was maximum in summer season followed by winter. The highest plant height was recorded in subrahi in both summer (120.90) and winter (116.20) seasons, whereas, the lowest was in MCU 7 in winter and summer seasons. Summer sown cotton exhibited significantly more number of bolls in all the varieties. When compared to winter season. The significantly higher number of boll per plant was recorded in variety AK 32 (73.33) in summer and winter (71.33) seasons followed by LRA5166 (70.67 and 68.00). The lowest numbers of bolls per plant was recorded in variety LRK 516 (40.00) in winter season. The highest boll weight was recorded in summer season. The variety LRA5166 had the highest boll weight in summer and winter season (4.75) and (4.37), respectively. The lowest boll weight was recorded in variety DHY 286-1 in winter (2.28) and summer (2.71) seasons. The highest number of seeds per boll and seed weight per boll were recorded in summer season and lowest in winter.

The lowest seed weight per boll was recorded in varieties *viz.,* DHY-286-1, LRK 516 and AK-32 in summer and winter season. While highest boll weight was recorded in LRA 5166, MCU-7 and Surabhi. The highest seed cotton yield per plant was recorded in varieties like LRA 5166 (128.88) followed by surabhi (126.47) in summer and LRA5166 (124.92) followed by surabhi (122.34) in winter. The lowest seed cotton yield per plant was recorded in DHY 286-1 (107.13) and (103.15) in both summer and winter season respectively. In variably of the both summer and winter seasons the genotype LRA 5166 recorded significantly high germination percentage (83 and 80), speed of germination (2.58 and 1.5) and Days to first flower followed by genotype surabhi in both summer (120.90) and winter (116.20). The genotype AK 32 recorded significantly maximum number of bolls per plant (73.33) in summer season (Table 1). The magnitude and high incidence of temperature, photoperiod and low incidence of RH which influence all the yield and yield character *viz.,* Boll weight (4.75), number of seeds per boll (31.00), seed weight (2.89) and seed

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Table 1. Effect of season on field performance in cotton

Treatment	Winter									Summer								
	Field emergence (%)	Speed of germination	Days to first flower	Plant height (cm)	Number of bolls / plant	Boll weight (gm)	Number of seeds per boll	Weight of seeds per boll	Seed cotton yield (gm)	Field emergence (%)	Speed of germination	Days to first flower	Plant height (cm)	Number of bolls / plant	Boll weight (gm)	Number of seeds per boll	Weight of seeds per boll	Seed cotton yield (gm)
LRA 5166	80.00	1.15	41.67	116.10	68.00	4.37	26.00	2.44	124.92	83	2.58	42.00	120.17	70.67	4.75	31.00	2.89	128.88
MCU 7	78	1.49	52.33	77.43	56.66	2.58	23.00	2.31	105.58	79	1.78	51.33	81.97	60.00	2.96	28.00	2.79	109.66
DHY 286-1	76	1.63	58.67	106.70	48.66	2.28	17.00	2.10	103.15	78	1.58	55.00	110.70	51.33	2.71	22.00	2.51	107.13
SURABHI	79	1.68	50.33	116.20	56.66	4.18	25.00	2.60	122.34	80	2.35	48.67	120.90	59.67	4.55	29.00	2.96	126.47
LRK 516	73	1.16	51.00	105.16	40.00	3.23	17.33	2.03	104.05	74	1.41	49.00	110.00	43.00	3.60	21.00	2.47	107.88
AK 32	72	1.21	50.00	116.00	71.33	3.78	23.66	2.09	113.12	75	2.05	47.00	119.40	73.33	4.18	27.00	2.56	118.07
SEd	0.46	0.17	0.38	0.30	0.48	0.02	0.36	0.012	0.07	0.80	0.30	0.65	0.53	0.83	0.04	0.61	0.03	0.30
CD (.05)	0.95	0.36	0.78	0.64	0.99	0.04	0.74	0.04	0.36	1.65	0.62	1.35	1.10	1.71	0.08	1.28	0.07	0.62

cotton yield (128.88). These traits were maximum in summer season in LRA 5166. From the fore going results, it can be concluded that the pre flowering period is greatly influenced by seasonal variation (Temperature, RH and photoperiod) whereas boll development and maturity period are relatively stable. The fluctuation in yield and number of bolls is the amplificated effect of variation of preflowering period occurring under influence of seasonal changes. The genotype LRA5166 could be regarded as the most ideal for year round cultivation as it has high yield, least coefficient of variation and highest number of bolls per plant. These results are in agreement with the findings of Sahoo *et al.* (1991), Nian *et al.* (1996). Mehetre and Jamdagni (1997), Shelar and Patil (2007) in soybean and Bensal *et al.* (1992) in groundnut. The LRA 5166 proved to be good genotype for both summer and winter cultivation. This could be expected as the genotypes used in this study belong to two species and diverse geographical origins and pedigree. These results are in conformity with those of Miller *et al.* (1962), Verhalen and Murray (1970), Thomson and Cunningham (1979), Gupta and Katiyar (1980), Mercado and Cabangbang (1984), Reid *et al.* (1989), Wang *et al.* (1990), Brown (1991) and Abdelrahman (1993). Earliness, normally out best indicator of high yields, strongly depends on favourable environmental conditions during the early season. Cool and wet conditions during the early part of the growing season adversely affect cotton development. Temperature has two main influences on cotton growth and development. Firstly it determines rates of morphological development and crop growth (eg. node development, rate of fruit production, photosynthesis and respiration) (Hearn and Constable, 1984). Secondly, it also helps to determine the start and end of a growing season (eg. timing of frosts).

Consequently climate change may increase average daily temperatures resulting in longer and better cotton growth (a positive effect). As cotton is a perennial crop, Warmer temperatures in southern growing regions offers potential to increase average yields as season length may be increased. For every extra week that the growth period (time between sowing and maturity) can be extended through warmer temperatures there is the potential to increase lint yield by 68 to 136 kg ha^{-1} (Bange and Milroy, 2004). In contrast, negative effects on cotton growth and development from climate change may result from increased number and severity of days with very high temperatures during the cotton season. These events will reduce yield by decreasing daily photosynthesis, and sometimes rising respiration at night, consuming stored assimilates which lead to increases in square and boll shedding and reducing seed numbers per boll. Increased incidences of heat stress can also directly damage cotton plant tissue causing parrot beaked bolls, boll freeze and cavitation which leads in reducing yield. Hotter temperatures during boll filling also predispose crops to lower fibre lengths and higher micronaire values. The consequences of hot conditions for yield and quality are exaggerated if water stress also occurs during these periods. These issues will be important for all cotton producing regions. Earlier sowing (Mid-July), resulted in better growth attributes and highest yield components than other delayed sowings. Consequently, seed cotton yield, lint yield and fibre quality were substantially improved. Hence based on the above result it was concluded that summer season is the suitable for higher seed yield in cotton genotypes. Among the genotypes LRA 5166 performed well both summer and winter season

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