

FLOWERING AND EARLINESS IN COTTON AS INFLUENCED BY SPACING AND FERTILIZER LEVELS UNDER RAINFED BLACK SOILS

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ABSTRACT

Studies were conducted at Cotton and Millets Experiment Station, Kovilpatti during Rabi 1983 and 1984 to study the effect of spacing (45x30cm and 60x30cm) and fertilizer levels (N_0P_0 , $N_{20}P_{20}$, $N_{40}P_{20}$ and $N_{60}P_{20}$ kg/ha) on flowering and earliness in four hirsutum Cotton varieties viz., KC. 1, Supriya, MCU. 10 and LRA. 5166. The results revealed that there was no significant difference between the varieties studied. The earliness of cotton varieties was significantly influenced by both spacing and fertilizer levels. Days taken for first flowering and 50 per cent flowering were also influenced by fertilizer levels. In respect of Bartlett's index, $N_{40}P_{20}$ kg/ha was found optimum considering the kapas yield. The normal and abnormal rainfall during the later part of the crop had no effect on the earliness of cotton.

Key words : Cotton, Flowering, Earliness, Spacing, Fertilizer levels

In Tamil Nadu, Cotton is cultivated in an area of 3.5 lakh hectares. Of this, more than 60 per cent area is under rainfed condition. Studies have shown that agronomic practices viz., plant spacing and fertilizer levels, particularly nitrogen, have influenced the earliness in cotton under irrigated condition. Information in this aspect is however lacking with reference to dryland cotton cultivation in black cotton soils of southern districts of Tamil Nadu.

Shanmugasundaram and Sankaran (1978) reported that nitrogen application caused delay in maturity in CBS. 156 hybrid cotton as compared to no nitrogen. They also reported that there was no significant variation among Bartlett's indices due to different spacing and planting pattern under irrigated condition. In Varalaxmi hybrid cotton, delayed maturity due to application of nitrogen has been reported

by Gururaj and Katarki (1974). Sanap *et al* (1978) found that boll opening was influenced significantly by nitrogen application at all stages viz., 60, 75, 90, 105 and 120 days after planting except on 135 days. Thirumurugan *et al* (1983) observed delay in maturity of CBS. 156 hybrid cotton due to increased nitrogen application and different spacings had no effect on earliness. Bartlett's index was considered as the most practical and useful means for finding out the earliness of cotton crops (Sivasubramanian, 1962).

To assess the influence of agronomic practices viz., plant spacing and fertilizer levels on the flowering and earliness of rainfed hirsutum cotton under black cotton soils, experiments were conducted during Rabi 1983 and 1984 at the Cotton and Millets Experiment Station, Kovilpatti.

MATERIALS AND METHODS

In the first year, three varieties viz., Kc.1, Supriya and MCU.10 were tried along with four levels of nitrogen and phosphorous viz., $N_0 P_0$, $N_{20} P_{20}$, $N_{40} P_{20}$ and $N_{60} P_{10}$ kg/ha and two levels of spacing viz., 45 x 30 cm and 60 x 30 cm. In the second year, one more variety-LRA. 5166 was included in the treatments. The experiments were laid out in split-plot design with three replications. The varieties were allotted in the main plot and spacing and fertilizer levels were allotted in the sub plots. The fertilizers were applied basally as per treatment. Cultural operations like weeding and hoeing and plant protection measures were followed uniformly for all the treatments.

RESULTS AND DISCUSSION

The data on number of days for first flowering, 50 per cent flowering, Bartlett's indices and rainfall particulars for two seasons (Rabi 1983 and 1984) are presented in Table 1. The rainfall during 1983-84 season was above normal since a rainfall of 297.1 mm was received during summer (Jan-March) which was not experienced for the past 10 years. The rainfall received during 1984-85 was normal. In both the years, the crop did not suffer for want of moisture in any of the critical stages of cotton.

DAYS FOR FIRST FLOWERING

The data on days for first flowering were collected only during the second year of study and were found to be significant. The first flowering was earlier by 2-3 days in MCU.10 and Kc.1 compared to Supriya and LRA. 5166. In respect of spacing, wider spacing of 60 x 30 cm took significantly more number of days for

first flowering compared to closer spacing of 45 x 30 cm. No fertilizer application (control) and $N_{60} P_{30}$ kg/ha had prolonged significantly the days for first flowering compared to $N_{10} P_{20}$ and $N_{20} P_{10}$ kg/ha.

DAYS FOR 50 PER CENT FLOWERING

The data on the days for 50 per cent flowering (50 per cent population) were statistically significant and the differences between varieties were 4 to 5 days in the first year of study and 2 to 3 days in the second year of study. MCU.10 (62.5 days) and Supriya (61.8) were two to three days earlier in 50 per cent flowering compared to Kc. 1 (59.6) and LRA. 5166 (59.9). This may be attributed to the varietal nature. Among the levels of fertilizer tested, there was significant delay in no fertilizer (control) treatment compared to all the three levels viz., $N_{20} P_{10}$, $N_{10} P_{20}$ and $N_{30} P_{10}$ kg/ha. The differences were 4 to 6 days in the first year and 2 to 3 days in the second year of study between no fertilizer and fertilized treatments. The earliness in 50 per cent flowering as well as first flowering in fertilizer plots may be attributed to early vigour of the cotton crop and the delay in flowering due to stunted growth and reduced vigour in no fertilizer treatments. The spacing levels had no significant effect on 50 per cent flowering in both the years. Barzer (1969) reported that nitrogen may prolong the growing period of cotton and delay the crop maturity under excessive or inadequate supply of nutrients.

BARTLETT'S RATE INDEX

In both the years, there was no significant difference between the varieties studied in respect of Bartlett's

Table 1. Flowering and earliness of cotton varieties as influenced by spacing and fertilizer levels:

Treatments	Days for first flowering		Days for 50 per cent flowering		Bartlett's Rate index		Rainfall particulars	
	1983-84		1984-85		Means of 2 years		1983-84	
	1983-84	1984-85	1983-84	1984-85	1983-84	1984-85	Rainfall in mm	Rainy days
A. VARIETIES :								
1. KC. 1.	51.40	60.40	58.70	59.60	0.58	0.69	—	—
2. Supriya	54.80	61.80	61.70	61.80	0.54	0.87	—	—
3. MCU. 10	51.80	65.80	59.30	62.50	0.57	0.70	—	—
4. LRA. 5166	53.30	—	59.90	59.90	—	0.67	—	—
S. E.	0.30	0.37	0.30	—	0.01	0.01	103.9	7
C. D. (P=0.5)	1.10	1.43	1.00	—	—	—	64.7	2
							60.9	2
							55.3	3
							37.6	3
							203.7	9
							167.3	7
							60.3	7
							753.7	40
							1984	1985
							53.5	5
							98.1	8
							145.5	6
							640.1	38
							780.1	49
							180.1	4
							2.0	—
							5.5	1
							333.0	13
B. FERTILIZER LEVELS :								
1. N ₀ P ₀ kg/ha	53.50	66.30	60.90	63.60	0.51	0.69	—	—
2. N ₅₀ P ₁₀ "	52.50	62.60	59.30	61.00	0.57	0.70	—	—
3. N ₁₀₀ P ₂₀ "	52.50	60.10	59.60	59.90	0.59	0.68	—	—
4. N ₁₅₀ P ₃₀ "	53.50	61.60	59.70	60.70	0.59	0.67	—	—
S. E.	0.20	1.24	0.20	—	0.01	0.01	—	—
C. D. (P=0.05)	0.70	3.55	0.50	—	0.02	0.02	—	—
							61.10	0.58
							61.50	0.55
							0.003	0.004
							0.009	0.012
C. SPACING :								
1. 45 x 30 cm	52.50	62.30	59.90	61.10	0.58	0.69	—	—
2. 60 x 30 cm	53.20	63.00	59.90	61.50	0.55	0.67	—	—
S. E.	0.20	0.72	0.10	—	0.003	0.004	—	—
C. D. (P=0.05)	0.50	—	—	—	0.009	0.012	—	—

Data not collected

indices. The closer spacing of 45x30cm recorded higher Bartlett's index of 0.64 compared to wider spacing of 60 x 30 cm which recorded 0.64, in both the years, indicating that lower plant density (55, 555 plants/ha) under wider spacing of 60 x 30 cm delayed the maturity significantly due to better vegetative growth under wider spacing compared to closer spacing. Regarding fertilizer levels tested, in the first year, no fertilizer treatment significantly delayed the maturity of cotton compared to other fertilizer levels tested. In the second year, the highest dose $N_{60}P_{10}$ kg/ha significantly lowered Bartlett's index of 0.67 and was on par with control (0.69). So it could be inferred that no fertilizer treatment delayed the maturity due to a set back in plant growth in the early stages caused by starvation and higher dose of $N_{60}P_{10}$ kg/ha delayed the maturity due to more of vegetative growth. In both the years, Bartlett's indices were on par at $N_{30}P_{10}$ and $N_{40}P_{20}$ kg/ha levels. However, considering the kapas yield, $N_{10}P_2$ kg/ha was found to be optimum.

It may be concluded that there was no significant difference between the varieties in respect of Bartlett's index. The earliness of cotton varie-

ties was significantly influenced by spacing and fertilizer levels under rainfed black soils. Days for first flowering and 50 per cent flowering were also influenced by fertilizer levels. The two years study also reveals that the abnormal rainfall during the latter part of the crop (Jan-March) during the first year had not influenced the earliness of cotton.

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