

Effect of Sowing Time, Spacing and Nitrogen Levels on Yield of Irrigated Cotton

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Field experiments were conducted in kharif seasons of 1978 and 1979 at Central Research Farm, Agriculture College, Gwalior, with Bikaneri Narma cotton. Three sowing dates (7th May, 22nd May, 7th June) as main-plot treatments, were tried with three spacings (60x15, 60x30 and 60x45 cm) and three levels of nitrogen (0, 40, 80 kg/ha) as sub-plot treatments. The yield and yield-attributing characters were favourably influenced by early sowing, narrow spacing and high N-levels. The sowing, of 7th May with 60x15 cm spacing and 80 kg/ha were found to be optimum for sandy-loam soil.

Among the various practices, sowing time, spacing and nitrogen levels are the inter-related factors to step-up the cotton yields. The effect of nitrogen with irrigation is greatly modified by the sowing time and spacing (Singh *et al.* 1969 a, 1969 b). Studies made so far indicate a most complex influence of these agronomical practices on cotton yield. Hence, a detailed study was made with the existing popular variety of "Bikaneri Narma" in the Gird region of Madhya Pradesh.

MATERIAL AND METHODS

The experiment was conducted in kharif seasons of 1978 and 1979 at the Agriculture College Farm, Gwalior. The experimental soil was a sandy-loam (pH 7.8, available N 132.5, kg P₂O₅ 48.6kg and K₂O 290kg/ha). There was adequate rainfall in both the years (682 mm in 1978 and 512 mm in 1979). Three sowing dates (7th May, 22nd May and 7th June), as main-plot treat-

ments, were tried with three spacings (60x15, 60x30 and 60x45 cm) and three levels of N (0, 40 and 80 kg/ha) as sub-plot treatments, in a split-plot design replicated two times. Seeds were sown by dibbling after giving pre-sowing irrigation. Half the dose of nitrogen and the entire quantities of 40 kg P₂O₅ and 40 kg K₂O/ha were drilled in lines at sowing time, and remaining N was top-dressed in two splits viz., after one month of sowing and at the square formation stage. Thinning and gap-filling was done just after germination to maintain uniform plant population in all the plots. The pre- and post-monsoon irrigations were given as per requirement. Plant protection measures were adopted as per schedule. The yields of seed-cotton were recorded in two pickings in each treatment.

RESULTS AND DISCUSSION

Sowing dates: The date of sowing produced the significant effect on

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the number of bolls and seed-cotton yield of Bikaneri Narma. The first date of sowing (7th May) gave the significantly highest yield of 20.0 q/ha over the later sowing dates (Table 2). Delayed sowing by 15 days (22nd May) decreased the yield by 3.0 q/ha, and 30 days delay in sowing (7th June) reduced the yield upto 8.9 q/ha. The yield reduction was due to decrease in plant-height ranging from 17 to 49 cm and in boll-numbers from 2.1 to 48 per plant.

Plant spacings: The plant spacings influenced the ancillary characters significant, by However, the yield per hectare was not significant. The wider spacings reduced the plant-height significantly in the first year, but, increased the number of bolls per plant significantly in both the years (Table 2). The closer spacing (60x15 cm) gave the maximum seed-cotton yield of 15.1 q/ha, but, when the plants were widely spaced (30x30 and 60x45 cm) the yields were not obtained upto that level; the yield decreases ranged from 0.5 to 0.9 q/ha. However, these yield reductions due to wider spacings were not upto the significant level over 60x15 cm spacing. The data revealed that the wider spacings beyond 60x15 cm had more number of bolls and consequently, the high seed-cotton yield in individual plants. The wider spacings have decreased the plant population per hectare to the extent that it had adversely affected the yield, even though, the compensatory effect of the wider-spaced plants (carrying the lower plant-population/ha) was so high that it could not reduce the per hectare yield significantly.

Nitrogen levels: The application of 40 or 80 kg N/ha did not bring about any significant contribution towards the ancillary characters and the yield of seed-cotton (Table 2). However, 80 Kg N/ha enhanced the yield by 0.9 q/ha over no nitrogen which was not un-economical. The lack of significant response to applied nitrogen in both the years may be due to its considerable losses through leaching, volatilization and denitrification in sandy-loam soils as it is also reported by Sharma and Ghosh (1976), Basudeo and Gangwar (1976). The interaction effects between the three factors were not found significant. According to the separate effect of these factors, the results lead to the conclusion that the cotton variety Bikaneri Narma may be sown on 7th May with 60x15 cm spacing and 80kg N/ha for obtaining the maximum yield.

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TABLE 1 Rainfall data (mm)

Year	June	July	August	September	October	November	Total
1978	73.3	256.2	253.6	99.1	—	—	682.2
1979	40.0	338.1	60.3	3.8	—	69.7	511.9

TABLE 2 Yield and yield-attributes as affected by various treatments

Treatments	Plant-height (cm)		Boll-number/plant		Seed-cotton-yield (q/ha)	
	1978	1979	1978	1979	1978	1979
<i>Dates of Sowing:</i>						
7th May	144	137	10.4	13.4	18.5	21.4
22nd May	130	117	8.4	11.1	16.0	18.0
7th June	83	101	5.8	8.4	8.8	13.4
C.D. (5%)	N.S.	N.S.	3.0	N.S.	1.4	2.4
<i>Spacings (cm)</i>						
60X15	114	116	5.8	7.9	12.1	18.0
60X30	105	123	6.8	10.4	11.4	17.7
60X45	104	116	7.8	14.6	11.5	17.0
C.D.	9.0	N.S.	1.6	2.5	N.S.	N.S.
<i>Levels of nitrogen (kg/ha)</i>						
0	104	114	6.4	10.6	11.6	17.2
40	108	121	7.1	11.0	11.2	17.3
80	110	120	9.3	11.3	12.3	18.2
C. D. (5%)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

Interactions between the three factors were not significant.