

Response of summer irrigated cotton (*Gossypium hirsutum*) to reduced level of nutrients and time of application

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The increasing cost of chemical fertilizers coupled with its adverse effect on soil health has necessitated the scientists to reorient the research with reduced level of inorganic fertilizers. In summer-irrigated conditions, cotton is sown in the rice stubbles without land preparation. Under such conditions, basal application of fertilizers is questionable. Besides, N applied as a basal fertilizer in cotton is mostly lost through volatilization and leaching (Krishnan and Christopher Lourduraj, 1997). Oosterhavis (1983) reported that inorganic N applied at sowing had little effect on plant N. Response of cotton to split application of recommended level of fertilizers was highlighted in AICCIP, 2001 and AICCIP, 2002. However, the response to reduced level of major nutrients needs to be studied. Hence the present investigation was carried out to study the response of summer-irrigated cotton to reduced level of fertilization by varying the time of application.

Field experiment was carried out during summer seasons of 2000 and 2001 at Cotton Research Station, Srivilliputtur, Tamil Nadu. The experimental field was sandy clay loam with a pH of 8.1 having medium available N (284 kg ha⁻¹) and phosphorus (13 kg ha⁻¹) and high available potassium (231 kg ha⁻¹). The experiment was laid out in randomized block design with four replications. The treatments included T₁: application of 100% recommended dose (RD) of fertilizers (60:30:30 kg NPK ha⁻¹) by applying half N and full P and K as basal + half N at 45 days after sowing (DAS); T₂: application of 75% RD of fertilizers as applied in T₁; T₃: application of 75% RD of fertilizers by applying full P and K as basal and N in two equal splits on 45 and 60 DAS; T₄: application of 75% RD of fertilizers by applying full P as basal and N and K in two equal splits on 45 and 60 DAS and T₅: application of 75% RD of fertilizers by

skipping basal and applying NPK in two equal splits on 45 and 60 DAS. The crop was sown on 21st March in 2000 and 15th February in 2001. The test variety was SVPR 2. The recommended spacing of 75 x 30 cm was adopted. Need based plant protection measures were carried out.

Growth and yield parameters and seed cotton yield was recorded at harvest. The data were subjected to statistical analysis following the procedure of Gomez and Gomez (1984).

Application of RD of fertilizers by applying 50% N and full P and K as basal and remaining at 45 DAS (T₁) registered the tallest plants and was comparable with application of 75% of RD of fertilizers as applied in T₁ and application of 75% RD by applying full P as basal and N and K in two splits on 45 and 60 DAS (T₄). The number of monopodia and sympodia was not influenced by the treatments. Application of 75% RD of fertilizers by applying full P as basal and N and K in two splits on 45 and 60 DAS registered the highest number of bolls/plant (20.2) and was comparable with the application of 75% RD of fertilizers by applying full P and K as basal and N in two splits on 45 and 60 DAS (T₃), application of 75% RD of fertilizers by skipping basal and applying NPK in low equal splits on 45 and 60 DAS (T₅) and conventional method of application of 100% RD of fertilizers by applying half N and full P and K as basal and half N at 45 DAS (T₁) and also registered the highest boll weight of 3.67g per boll. This was comparable with T₅.

The highest mean seed cotton yield of 1865 kg ha⁻¹ was recorded with the application of 100% RD of fertilizers by applying half N and full P and K as basal and half N at 45 DAS and was comparable with T₃, T₄

Table 1. Effect of treatments on growth and yield of cotton (pooled mean for two years)

	Plant ht. (cm)	Mono- podia No/plant	Sym- podia No/plant	Bolls No/plant	Boll wt. (g)	Yield kg ha ⁻¹	Seed index	Lint index	G.P.
T ₁	100.0	1.3	16.5	18.4	3.67	1865	7.43	3.64	34.7
T ₂	95.6	1.3	16.2	18.3	3.49	1704	6.64	3.27	33.8
T ₃	93.7	1.2	16.3	20.0	3.48	1730	6.97	3.39	33.8
T ₄	94.3	1.3	15.8	20.2	3.56	1741	7.41	3.59	34.0
T ₅	93.3	1.3	16.5	20.0	3.64	1772	7.35	3.61	34.3
SEd	3.1	0.2	0.9	0.9	0.05	74	0.19	0.11	0.31
CD (P=0.05)	6.2	NS	NS	1.8	0.10	152	0.40	0.23	0.62

NS : Nonsignificant; G.P. : Ginning Percentage

and T₅. The results indicated the advantage of splitting NPK when applied at 25% reduced level. The split application of N and K might have increased the root activity of cotton at peak flowering and boll bursting stage thus resulting in increased P uptake (Krishnan and Christopher Lourduraj, 1997) which might have contributed to the increased seed cotton yield level comparable to that of recommended level of fertilizers.

The highest seed index of 7.43g was registered under T₁ and was comparable with T₄ and T₅, which involved the reduced level of fertilizers. Under reduced level, split application of N and K might have resulted in better N uptake due to reduced fixation of NH₄⁺ due to K and thereby there was higher utilization of N in this form (Sen Gupta *et al.* 1971). Besides increased root activity of cotton, better nutrient uptake and ultimately seed development might have resulted in higher seed index in the split application of nutrients. The lint index and ginning percentage have also followed a similar trend.

The results revealed that under reduced level of fertilization, split application of 75% of the recommended nutrients (45:22.5:22.5 kg NPK ha⁻¹) by applying all NPK in two splits at 45 and 60 DAS or applying entire P as basal and N and K in two splits on 45 and 60 DAS or applying entire P as basal and N and K in two splits on 45 and 60 DAS

was advantageous registering a mean benefit cost ratio of 2.43 as against 2.47 for the application of 100% recommended dose of fertilizers.

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