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Nutrient uptake in late sown Bt cotton (*Gossypium hirsutum* L.) as influenced by plant spacings, fertilizer levels and NAA application under irrigation

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Key words : Nutrient uptake, Bt cotton, Spacing, Fertilizer levels, NAA sprays

A field experiment was conducted to study the response of nutrient uptake in late sown Bt cotton as influenced by plant spacings, fertilizer levels and NAA application under irrigation in vertisol during 2006-07 at College of Agriculture, Raichur farm, University of Agricultural Sciences, Dharwad. The results of the investigation indicate that higher N, P and K uptake was noticed with close plant spacing (90 x 30 cm) along with 150 % RDF and three sprays of NAA. Interaction effect were found to be non significant.

Cotton is very specific to its climatic requirements and reacts unfavorably for any shift in dates of sowing from the normal period. In Tungabhadra project (TBP) area of Karnataka, the optimum time for sowing of hybrid cotton is upto July second fortnight. In this region, delay in sowing beyond normal time becomes inevitable due to partially or total failure of early rains and/or late release of canal water in *Kharif* season (Rao and Janawade, 2006). This compels the farmers to go in for late sowing of cotton. In the present study, attempt was made to study the response of nutrient uptake in late sown Bt cotton as influenced by plant spacings, fertilizer levels and NAA application under irrigation in vertisol in the Deccan zone.

The field experiment was conducted during 2006-07 in Vertisol at College of Agriculture, Raichur, farm University of Agricultural Sciences, Dharwad (Karnataka). The experiment was laid out on medium black soil with a split- split plot design. There were 18 treatment combinations replicated three times with three plant spacings (90 x 30 cm, 90 x 45 cm, 90 x 60 cm) in main plots, fertilizer levels (100 % RDF and 150 % RDF) in sub plots and growth regulator sprays (control water spray), NAA @ 10 ppm-two sprays at flower commencement and full blooming stage and NAA @ 10 ppm-three sprays at squaring, flower commencement and full blooming stage in sub-sub plots. The recommended dose of fertilizer (RDF) for cotton comprised of 150:75:75 NPK kg ha^{-1}.

The cultivar used was Bunny Bt. The crop was sown by delaying one and half month beyond optimum schedule on 25th September, 2006. The other cultivation practices were followed as per recommended package.

Nutrient (N, P and K) uptake was significantly higher with increase in plant density from 18,518 plants ha^{-1} with 90 x 60 cm (83.64, 12.14 and 90.71 kg ha^{-1} NPK, respectively) to 37,036 plant ha^{-1} with 90 x 30 cm spacing (102.76, 22.98 and 112.93 kg ha^{-1} NPK, respectively) (Table 1 and Fig. 1). It may be due to more number of plants per unit area (hence, higher total dry matter) in 90 x 30 cm spacing. Uptake of nitrogen, phosphorus and potassium by cotton at harvest was significantly higher with 150 per cent RDF (96.88, 18.11 and 105.33 kg ha^{-1}, respectively) compared to 100 per cent RDF (89.67, 14.71 and 98.08 kg ha^{-1}, respectively) (Table 1 and Fig. 1). This increase in uptake of nutrients may be attributed to higher total dry matter production. These results are in accordance with the findings of Katkar *et al.* (2002), Krishnegowda (2004) and Sisodia and Khamparia (2007). Nitrogen, phosphorus and potassium uptake by cotton crop were significantly higher at harvest with three sprays of NAA (96.81, 19.10 and 105.33 kg ha^{-1}, respectively)

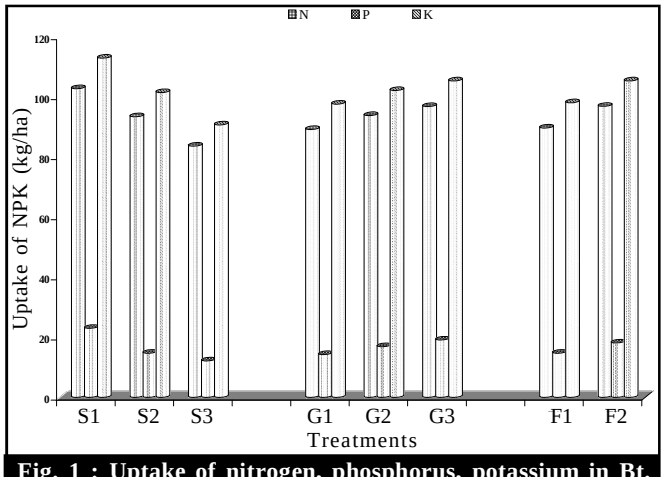

Fig. 1 : Uptake of nitrogen, phosphorus, potassium in Bt. cotton as influenced by management practicesunder late sown conditions

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Table 1 : Total dry matter production (g plant^{-1}) and uptake of nitrogen, phosphorus and potassium in Bt cotton as influenced by management practices under late sown conditions

Treatments	TDM (g plant^{-1})	Nitrogen (kg ha^{-1})	Phosphorus (kg ha^{-1})	Potassium (kg ha^{-1})
Plant spacings (S)				
S_1- 90 x 30 cm (37,036 plants ha^{-1})	446.37	102.76	22.98	112.93
S_2- 90 x 45 cm (24,691 plants ha^{-1})	457.96	93.42	14.71	101.47
S_3- 90 x 60 cm (18,518 plants ha^{-1})	469.96	83.64	12.14	90.71
S. E.±	3.85	1.45	0.30	1.43
C.D. (P=0.05)	10.53	5.69	1.19	5.65
Fertilizer levels (F)				
F_1- 100 % RDF	452.52	89.67	14.71	98.08
F_2- 150 % RDF	463.68	96.88	18.11	105.33
S. E.±	1.64	1.24	0.37	1.27
C.D. (P=0.05)	5.70	4.30	1.30	4.41
Growth regulator sprays (G)				
G_1- Control (water spray)	430.82	89.18	14.25	97.63
G_2- NAA @ 10 ppm (2 sprays)	463.95	93.82	16.88	102.15
G_3- NAA @ 10 ppm (3 sprays)	479.51	96.81	19.10	105.33
S. E.±	4.73	0.99	0.74	1.10
C.D. (P=0.05)	13.81	2.82	2.16	3.09
Interactions				
S x F				
S. E.±	2.85	2.15	0.65	2.20
C.D. (P=0.05)	NS	NS	NS	NS
S x G				
S. E.±	8.19	2.80	1.46	2.96
C.D. (P=0.05)	NS	NS	NS	NS
F x G				
S. E.±	6.91	2.28	1.19	2.42
C.D. (P=0.05)	NS	NS	NS	NS
S x F x G				
S. E.±	8.19	2.80	1.46	2.96
C.D. (P=0.05)	NS	NS	NS	NS

N.S.-Non Significant

(Table 1 and Fig. 1). The increased yield might be due to application of growth regulator (NAA) as foliar spray which augmented the metabolic action of the plant that resulted in higher uptake of NPK and enhanced the photosynthetic efficiency of the plant (Hanumanthreddy, 1999). The higher NPK uptake may also be attributed to higher total dry matter production.

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