

Original Article

Effect of Different Nutrients And Spacing On Growth And Yield Attributes, Seed Cotton Yield, And Economics of Bt Hybrid Hirsutum Cotton

¹Jagdish Kumar, HG Prakash², Achila Singh³ and Deepti Pal⁴

Cotton Section, CSA University of Agriculture and Technology, Kanpur (UP) 208002, India

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Abstract - A field experiment was conducted during the Kharif season of 2016 at the oilseed research farm, C.S. Azad University of Agriculture and Technology, Kanpur, to see the effect of different nutrients and spacing in Bt hybrid hirsutum cotton. Data indicated that significantly higher plant height was recorded with the Bt hybrid 6488 BGII (199.5 cm) than non-Bt variety (125.5 cm), and this plant height was at with all the rest treatments. Application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) +Soil application of ZnSo₄ (20 kg/ha) +foliar spray of 2% Urea and 2% DAP with Bt hybrid (6488 BGII) produced a greater number of bolls per m² (133.7) and boll wt (4.3g) than all the rest treatments significantly. Application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) +Soil application of ZnSo₄ (20 kg/ha) +foliar spray of 2% Urea and 2% DAP with Bt hybrid (6488 BGII) produced significantly higher seed cotton yield (3904 kg/ha) and lint yield (1352 kg/ha) followed by application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) +soil application of ZnSo₄ (25 kg/ha) (3873 kg/ha) and (1340 kg/ha) seed cotton yield and lint yield, respectively, as compared to all the rest treatments. Application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) +Soil application of ZnSo₄ (20 kg/ha) +foliar spray of 2% Urea and 2% DAP with Bt hybrid (6488 BGII) increased significantly higher seed cotton yield to the tune of 27.6 % as compared to the application of 100% RDF+ Normal spacing (67.5x 60 cm) with Bt hybrid (6488 BGII) (3058 kg/ha). Significantly higher GOT (34.7 %) was obtained with application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) +Soil application of ZnSo₄ (20 kg/ha) +foliar spray of 2% Urea and 2% DAP with Bt hybrid(6488 BGII) as compared to 100% RDF+ Normal spacing (67.5x30 cm) with Non Bt variety (Vikas)(33.3 %). Highest net return(Rs 128216/ ha) and B:C ratio (2.74) were recorded with application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) +Soil application of ZnSo₄ (20 kg/ha) +foliar spray of 2% Urea and 2% DAP with Bt hybrid(6488 BGII) followed by application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) +soil application of ZnSo₄ (25 kg/ha) with Bt hybrid (6488 BGII) (Rs 126236.00/ha) and (2.68) net return and B:C ratio, respectively.

Keywords - b:c ratio, bt cotton, ginning outturn, hybrids, lint yield, the net return, spacing, seed cotton yield. and ZnSo₄.

I. INTRODUCTION

Cotton is an important commercial fiber crop of India and plays a significant role in the Indian economy by providing 30 percent of total export earnings. In India, it was grown on an area of about 12.23 mha with the production of 361 lakh bales and productivity of 501 kg/ha during 2018-19. India has the 1st rank in the area and production of cotton in the world (Anonymous, 2018). The introduction of Bt cotton in Indian agriculture has resulted in an immense increase in seed cotton yield. Report of spectacular yield increase and substantial reduction in insecticide with Bt cotton cultivation is being reported wide in India. Sunitha et al. (2010). The maximum yield potential of Bt hybrids can only be realized with suitable agronomic practices like plant geometry, optimum fertilization, and irrigation over the years. Several research workers have studied the effect of Bt hybrids and fertilizer doses on the performance of Bt cotton in a different locations in India and found different spacing and fertilizer doses suitable for the particular area. (Singh et al.2011 and Butter et al .2010). Application of micronutrients through foliar application has shown the importance for their efficient utilization of better performance of the crop (Rathinavel et al.1999). Squaring, blooming and boll development are stages where cotton makes higher nutrients demand. Augmentation of nutrients supply through foliar application at such critical stages may increase cotton yield (Bhat and Nathu,1986)

Keeping the above view in mind, the experiment was carried out to see the effect of different nutrients and spacing on growth, yield attributes, and seed cotton yield of Bt hybrid hirsutum cotton.

II. MATERIALS AND METHODS

The field experiment was conducted during the Kharif season of 2016 at Oilseed Research Farm, Kalyanpur, C.S. Azad University of Agriculture and Technology, Kanpur, to study the effect of different nutrients and spacing on growth, yield attributes, and seed cotton yield in Bt hybrid cotton. In all 7 treatments viz T1-100% RDF+ Normal spacing (67.5x30 cm) with Non Bt



variety (Vikas), T-2-100% RDF+ Normal spacing (67.5x 60 cm) with Bt hybrid(6488 BGII), T3-100% RDF+ 25% less than normal spacing (67.5x 45 cm) with Bt hybrid(6488 BGII) , T4-125% RDF+ 25% less than normal spacing (67.5x 45 cm) with Bt hybrid(6488 BGII), T5-125% RDF+ 25% less than normal spacing (67.5x 45 cm) + foliar application of 1 % MgSo4 and 0.5% ZnSo4 with Bt hybrid(6488 BGII), T6-125% RDF+ 25% less than normal spacing (67.5x 45 cm) +soil application of ZnSo4 (25 kg/ha) with Bt hybrid (6488 BGII) and T7-125% RDF+ 25% less than normal spacing (67.5x 45 cm)+Soil application of ZnSo4 (20 kg/ha)+foliar spray of 2% Urea and 2% DAP with Bt hybrid(6488 BGII), were tested in randomized block design with four replications. The soil of the experimental field was sandy loam in texture having a pH of 7.8, low in available OC% (0.31), medium in available P₂O₅ (17 kg/ha), and high in available K₂O (271 kg/ha). The sowing of the cotton crop was done on 02.06.16. Recommended fertilizer dose was applied for hybrid (90:60:20kg NPK/ha) and for variety (60:30:20 Kg NPK/ha). Picking of the crop was done from 24-11-16 to 25-11-16 during the study.

III. RESULTS AND DISCUSSION

Data indicated (Table -1) that all the yield attributing characters *viz* number of bolls per plant and boll wt (g) were improved significantly with Bt hybrid than non-Bt variety. Significantly higher plant height was recorded with the Bt hybrid 6488 BGII (199.5 cm) than non-Bt variety (125.5 cm), and this plant height was at with all the rest treatments. Application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) +Soil application of ZnSo4 (20 kg/ha) +foliar spray of 2% Urea and 2% DAP with Bt hybrid (6488 BGII) produced a greater number of bolls per m² (133.7) and boll wt (4.3g) than all the rest treatments significantly. Application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) +Soil application of ZnSo4 (20 kg/ha) +foliar spray of 2% Urea and 2% DAP with Bt hybrid (6488 BGII) produced significantly higher seed cotton yield (3904 kg/ha) and lint yield (1352 kg/ha) followed by application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) +soil application of ZnSo4 (25 kg/ha) (3873 kg/ha) and (1340 kg/ha) seed cotton yield and lint yield, respectively, as compared to all the rest treatments. Application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) +Soil application of ZnSo4 (20 kg/ha) +foliar spray of 2% Urea and 2% DAP with Bt hybrid (6488 BGII) increased significantly higher seed cotton yield to the tune of 27.6 % as compared to the application of 100% RDF+ Normal spacing (67.5x 60 cm) with Bt hybrid (6488 BGII) (3058 kg/ha). Application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) + foliar application of 1 % MgSo4 and 0.5% ZnSo4 with Bt hybrid (6488 BGII) produced also more seed cotton yield (3361 kg/ha) than application of 100% RDF+ Normal spacing (67.5x 60 cm) with Bt hybrid (6488 BGII) (3058 kg/ha). The increase in seed cotton yield with higher doses of nutrients and closer spacing might be due to an increase in the number of bolls per square meter and boll wt (g). These results are in conformity with the finding of

Nehra *et al.* (2004), Kalaichelvi (2009), Butter *et al.* (2010), Kumar *et al.* ((2010), Sarang *et al.* (2010), Kaur *et al.* (2010), Devraj *et al.* (2011), Kumar *et al.* (2011), Kulvir *et al.* (2011), Singh *et al.* (2011). Singh *et al.* (2004) reported that the positive effect of urea and DAP to the yield and yield attributing characters might be due to N and P added to the crop directly through foliage which was readily available for the development of plant growth finally seed cotton yield. Significantly higher GOT (34.7 %) was obtained with application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) +Soil application of ZnSo4 (20 kg/ha) +foliar spray of 2% Urea and 2% DAP with Bt hybrid(6488 BGII) as compared to 100% RDF+ Normal spacing (67.5x30 cm) with Non Bt variety (Vikas)(33.3 %). Highest net return(Rs 128216/ ha) and B:C ratio (2.74) were recorded with application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) +Soil application of ZnSo4 (20 kg/ha) +foliar spray of 2% Urea and 2% DAP with Bt hybrid(6488 BGII) followed by application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) +soil application of ZnSo4 (25 kg/ha) with Bt hybrid (6488 BGII) (Rs 126236.00/ha) and (2.68) net return and B:C ratio, respectively .The increase in net return and B: C ratio of cotton might be due to an increase in seed cotton yield with the higher RDF of fertilizer and closer spacing. These results are in agreement with the finding of Jadhav *et al.* (2012).

IV. CONCLUSIONS

On the basis of the above results, it may be concluded that application of 125% RDF+ 25% less than normal spacing (67.5x 45 cm) +Soil application of ZnSo4 (20 kg/ha) +foliar spray of 2% Urea and 2% DAP with Bt hybrid (6488 BGII) followed by application of 125% RDF+25% less than normal spacing (67.5x 45 cm) +soil application of ZnSo4 (25 kg/ha) was found to be most productive and remunerative for cotton.

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Table: I:

Effect of different nutrients and spacing on growth and yield attributes, seed cotton yield in Bt hybrid cotton.

Treatments	Plant Height (cm)	Number of bolls /m ²	Boll wt (g)	Plant stand /ha	Seed cotton Yield (kg/ha)	GOT%	Lint yield (kg/ha)	Net return (Rs)	B: C Ratio
T1	125.5	93.35	3.6	43213	2036	33.3	683	55019	2.31
T2	192.2	107.3	4.1	29014	3058	34.5	1063	96376	3.19
T3	192.2	110.1	4.0	28397	3209	34.6	1112	98616	3.20
T4	191.1	112.0	4.1	30249	3348	34.4	1152	105000	3.28
T5	189.2	113.8	4.1	27162	3361	34.6	1166	105520	3.26
T6	191.0	117.8	4.0	27780	3873	34.7	1340	126236	3.68
T7	199.5	133.7	4.3	28551	3904	34.7	1352	128216	3.74
SED	6.40	1.59	0.41	803.73	244.61	0.262	86.30	-	-
CD AT 5%	13.46	2.90	NS	1688.90	514.01	0.552	181.34	-	--

T1- 100% RDF+ Normal spacing (67.5x30 cm) with Non Bt variety (Vikas), T-2-100% RDF+ Normal spacing (67.5x 60 cm) with Bt hybrid(6488 BGII), T3-100% RDF+ 25% less than normal spacing (67.5x 45 cm) with Bt hybrid(6488 BGII) , T4-125% RDF+ 25% less than normal spacing (67.5x 45 cm) with Bt hybrid(6488 BGII), T5- 125% RDF+ 25% less than normal spacing (67.5x 45 cm) + foliar application of 1 % MgSo4 and 0.5% ZnSo4 with Bt hybrid(6488 BGII), T6-125% RDF+ 25% less than normal spacing (67.5x 45 cm) +soil application of ZnSo4 (25 kg/ha) with Bt hybrid (6488 BGII) and T7-125% RDF+ 25% less than normal spacing (67.5x 45 cm)+Soil application of ZnSo4 (20 kg/ha)+foliar spray of 2% Urea and 2% DAP with Bt hybrid(6488 BGII).