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Performance of *hirsutum* cotton genotypes to different fertilizer levels under high density planting system

G.D. GADADE , D.N. GOKHALE, AND A.S. CHAVAN*
Department of Agronomy, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani – 431402
** E-mail : anil.bunty212@gmail.com*

ABSTRACT : The field experiments were undertaken continuously for 2 successive years during *kharif,* 2010 and 2011 at Department of Agronomy, Marathwada Krishi Vidyapeeth, Parbhani. The soil of the experimental site was clayey in texture having pH 7.6, organic carbon 0.47 per cent, with status of low in nitrogen and low in phosphorus and high in available potash. The studies included 3 genotypes (V_1 – NH 545, V_2 –NH 452 and V_3 – AKH 081) in main plots and 4 fertilizer levels (F_1-75 per cent RDF (45:22.5:22.5 NPK kg/ha), F_2- 100 per cent RDF (60:30:30 NPK kg/ha), F_3- 125 per cent RDF (75:37.5:37.5 NPK kg/ha) and F_4- 150 per cent RDF (90:45:45 NPK kg/ha) in sub plots in split plot design with 3 replications. The performance of NH 545 found productive and profitable as compared to rest of the *hirsutum* genotypes. The application of 75:37.5:37.5 NPK kg/ ha was in realizing economically higher yield in high density planting system. Lowest seed cotton yield was recorded with absolute control.

Key words : Cotton, fertilizer levels, high plant density

Cotton is an important commercial crop grown all over India. Maharashtra ranks first in acreage (39.73 lakh ha) and stands second in production (92.00 lakh bales) whereas, the average productivity of cotton is around 394 kg lint/ha. Hence, there is great scope to exploit its yield potential. *Bt* cotton technology has been widely accepted by the Indian farmers due to its inbuilt technology of bollworm management. The higher prices of *Bt* cotton seed and the additional amount incurred on control of sucking pests, is again increased the production cost. Thus, to overcome this situation, development of location specific package of practices to augment productivity is of prime importance. Precise nutrient management, efficient use of improved genotypes and adoption of high density planting system are some of the agronomic measures, that needs to be tested for realizing the cost effective production in varied agroclimatic situation. Keeping these points in view, the present studies were undertaken to investigate the response of *hirsutum* cotton genotypes to different fertilizer levels at close planting crop at a distance of 45x 15 cm.

METHODS AND MATERIALS

The field experiments were undertaken continuously for 2 years during *kharif* , 2010 and 2011 at Department of Agronomy, Marathwada Krishi Vidyapeeth, Parbhani. The soil of the experimental site was clayey in texture having pH 7.6, organic carbon 0.47 per cent, with status of low in nitrogen and low in phosphorus and high in available potash. The studies include 3 genotypes (V_1 – NH545, V_2 –NH452 and V_3 – AKH081) in main plots and 4 fertilizer levels (F_1-75 per cent RDF (45:22.5:22.5 NPK kg/ha), F_2-100 per cent RDF (60:30:30 NPK kg/ ha), F_3- 125 per cent RDF (75:37.5:37.5 NPK kg/ ha) and F_4-150 per cent RDF (90:45:45 NPK kg/ ha) in sub plots in split plot design with 3 replications. The crop was sown in early July during both years at a spacing of 45 x 15 cm to accommodate the double plant population (1,48,148 plants/ha). As per the treatments, nitrogen was applied in 2 equal splits at sowing and 30 days after sowing, while full dose of phosphorus and potash were applied as basal dose at sowing. All other practices were followed as per recommendations.

The rainfall during crop growth period for the two consecutive years during 2010-2011 and 2011-2012 was 1152 mm and 685mm, respectively.

RESULTS AND DISCUSSION

Effect of genotypes: Perusal of data on yield attributes *viz.*, bolls/ plant and boll weight (Table 1) revealed that the variety NH 545 recorded significantly highest yield attribute values over rest of the genotypes during both the years. The probable reason of this might be the variation in the genetic constitution of the variety which has responded better in harvesting the maximum bolls and good boll weight.

Similarly, variety NH 545 had recorded highest seed cotton yield and found significantly superior to rest of the varieties during both the years (1285 and 1703 kg/ha), respectively and in pooled analysis (1494 kg/ha). The probable reason for this might be the higher values in respect of yield attributes that has contributed in achieving the maximum seed cotton yield by the respective genotype. These results are in closer conformity with the findings of Sharma *et.al.,*. (2001) and Sisodia and Khamparia (2007) and Bastia (2000).

Data presented in Table 1 revealed that, the highest gross monetary returns, net monetary returns and benefit cost ratio (B:C) was recorded with variety NH 545 and found significantly superior to rest of the varieties during both the years.

Effect of fertilizer levels: The perusal of the data (Table 1) indicated that seed cotton yield increased with increasing levels of fertilizer upto 125 per cent RDF (75:37.5:37.5 NPK kg/ ha). Beyond it, there was decreased in yield with increased in fertilizer level. Thus application of 125 per cent RDF (75:37.5:37.5 NPK kg/ha) was found maximum yielder and recorded significantly higher yield attributes over 75 per cent RDF and 100 per cent RDF. These findings are in agreement with the earlier findings reported by Singh and Manikar (2000).

Significantly highest seed cotton yield (1341 and 1667 kg/ha) were obtained at 125 per cent RDF (75:37.5:37.5 NPK kg/ ha) during both the years and in pooled analysis (1554 kg/ha) over 75 per cent and 100 per cent RDF, however it was *at par* with 150 per cent RDF. Increased level of fertilizer increased the boll numbers and boll weight, which ultimately helped in increasing the seed cotton yield. Similar results were reportedby Rekha *et al.*,(2008) , Singh and Gill (2007) and Sunitha *et al,*. (2010) and Tomar *et al.*, (2000).

Among different fertilizer levels tested,

Table 1. Yield attributes, yield and economics of *hirsutum* cotton as influenced by different treatments

Treatments	Bolls/ plant		Boll weight (g)		SCY (kg/ha)			GMR (Rs/ha)		NMR (Rs/ha)		B:C ratio	
	2010-2011	2011-2012	2010-2011	2011-2012	2010-2011	2011-2012	**Mean**	2010-2011	2011-2012	2010-2011	2011-2012	2010-2011	2011-2012
Varieties (V)													
V_1 NH 545	7.58	10.40	2.08	2.44	1285	1703	**1494**	61703	64377	39840	42514	1.82	1.94
V_2 NH 452	7.19	9.88	1.98	2.32	1221	1523	**1372**	58612	57876	36749	36013	1.68	1.65
V_3 AKH 081	7.29	10.02	2.00	2.35	1238	1540	**1389**	59443	60022	37580	38159	1.72	1.74
SE ±	0.04	0.05	0.01	0.01	6.92	35.38	**33.29**	332	708	275	655	0.01	0.03
C D (p = 0.05)	0.15	0.22	0.04	0.05	27.19	138.8	**103.4**	1305	2786	880	2183	0.05	0.12
Fertilizer levels (F)													
F_1 RDF (75%)	6.94	9.54	1.91	2.24	1179	1421	**1300**	56599	53588	35155	32144	1.64	1.50
F_2 RDF (100%)	7.13	9.79	1.96	2.30	1210	1499	**1354**	58089	56979	36406	35296	1.68	1.63
F_3 RDF (125%)	7.89	10.85	2.17	2.55	1341	1667	**1554**	64373	70025	42450	48102	1.94	2.19
F_4 RDF (150%)	7.43	10.22	2.04	2.40	1263	1665	**1464**	60616	62442	38215	40041	1.71	1.79
SE ±	0.17	0.24	0.04	0.05	29.95	74.19	**30.17**	1437	2978	829	2233	0.06	0.14
C D (p = 0.05)	0.52	0.72	0.14	0.16	88.98	220.4	**93.77**	4271	8847	2447	6874	0.19	0.40

application of 125 per cent RDF recorded significantly higher gross monetary returns over lower fertilizer levels but *at par* with 150 per cent RDF during both the years. As regards to NMR and B:C ratio, the application of 125 per cent RDF recorded the highest values and found significantly superior to rest of the fertilizer levels during both the years. However, the lowest net monetary returns and B: C ratio was recorded in 75 per cent fertilizer levels.

Based on the two years study, it could be concluded that performance of NH 545 found productive and profitable as compared to rest of the *hirsutum* genotypes. The application of 75:37.5:37.5 NPK kg/ ha was in realizing economically higher yield in high density planting system.

Interaction effect between genotypes and fertilizer levels was found not significant.

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