

Table 2. Effect of plant density, fertilizer level and variety on different plant parameters and yield

Response of newly released cotton (*Gossypium hirsutum*) varieties to plant densities and fertilizer levels

MOOLA RAM AND A. N. GIRI

Cotton Research Scheme, Marathwada Agricultural University, Parbhani-431402

ABSTRACT: A field experiment was conducted on clayey soils at Cotton Research Scheme, Marathwada Agricultural University, Parbhani during rainy season of 2003-04 with the objective to find out the suitable plant density and fertilizer level for newly released cotton genotypes viz. NH 545 and PH 348. The results revealed that the highest plant density of 55555 plants/ha and fertilizer level of 50:25:25 NPK kg/ha proved suitable and beneficial for these varieties in enhancing seed cotton yield.

Key words: *Gossypium hirsutum*, plant density, fertilizer level, yield

The potential of new genotypes of *Gossypium hirsutum* can be fully realized only after determining their nutrient needs and plant geometry. The yield parameters and their components have been found to vary with fertilizers application under variable population pressure (Ahlawat *et al.*, 1973; Shrinivasan *et al.*, 1979; Jain and Katti, 1980). However, such agronomic requirements needed to be ascertained in relation to the new genotypes under a given set of environments and soil conditions of Marathwada region of Maharashtra, where cotton is a major cash crop.

A field experiment was conducted during *kharif*, 2003-04 at Cotton Research Scheme, Marathwada Agricultural University, Parbhani. The soil of the experimental field was clayey having available N 100.98 kg/ha, available phosphorus (P_2O_5) 22.82 kg/ha, available potassium (K_2O) 326.20 kg/ha, EC 0.32 dS/m at 25°C and organic carbon 0.52 per cent with pH of 7.9. Nine treatment combinations comprising of three plant densities (D_1 -55555, D_2 -37037 and D_3 -27777 plants/ha) and three fertility levels (F_1 -40:20:20, F_2 -50:25:25 and F_3 -60:30:30 NPK kg/ha) in the main plots and two genotypes (V_1 -

NH 545 and V_2 -PH 348) in the sub plots were laid out in split plot design with three replications. The rainfall received during the crop growth period (June to January) is presented in Table 1. Half dose of nitrogen along with full dose of phosphorus and potash were applied as basal dose and the remaining half of the nitrogen was top dressed at 40 days after sowing. The crop was sown on 3rd July 2003 and pickings were done between November 2003 and January 2004.

Effect of plant densities : Growth in terms of plant height increased appreciably with increased plant density. The plant density of 55555 plants/ha (60 x 30cm spacing) produced significantly more height than lower plant densities but dry matter accumulation/plant increased with corresponding decrease in plant population/ha. Highest seed cotton yield/ha was recorded by highest plant density which was significantly more than both the plant densities. Similar findings were reported by Narkhede *et al.* (2000).

Effect of fertilizer levels: The increasing level of NPK (40:20:20, 50:25:25 and 60:30:30 kg/ha) increased the growth characters viz. plant height and dry matter/plant

Table 1. Rainfall distribution during crop growth period

Month	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Total
Rainfall(mm)	79.2	429.1	140.8	28.9	49.0	0	0	7.8	734.8

Table 2. Effect of plant density, fertilizer level and variety on different plant parameters and yield

Treatment	Plant height (cm)	Monopodial/ plant	Sympodial/ plant	Dry matter (g/plant)	picked bolls/ plant	Yield/ plant (g)	Boll weight (g)	Halo length (mm)	Yield (kg/ha)
Plant density									
D ₁	83.11	2.38	13.87	109.03	8.27	16.47	1.99	25.92	915.39
D ₂	80.40	2.40	14.28	110.78	10.67	21.53	2.03	25.78	799.28
D ₃	77.61	2.41	14.38	112.25	13.78	28.12	2.06	27.38	793.61
CD at 5%	0.81	NS	NS	1.49	1.19	2.39	NS	NS	95.28
Fertilizer level									
F ₁	76.88	2.38	12.56	105.86	9.66	19.73	2.01	24.68	745.28
F ₂	81.03	2.40	14.35	112.86	10.96	21.76	2.02	26.36	841.11
F ₃	83.19	2.42	15.62	113.83	12.10	24.62	2.04	28.04	921.89
CD at 5%	0.81	NS	1.65	1.49	1.19	2.39	NS	1.68	95.28
Variety									
V ₁	72.34	2.38	14.27	110.57	11.05	21.92	2.01	24.84	836.59
V ₂	88.40	2.42	14.09	110.80	10.77	22.15	2.04	27.87	835.59
CD at 5%	0.88	NS	NS	NS	NS	NS	NS	1.48	NS

over its lower level (Table 2). Application of higher level of NPK i.e 60:30:30: kg/ha had significant effect on yield attributes as compared to lower levels, except boll weight. Seed cotton yields increased with in increasing levels of NPK. However, 60:30:30: and 50:25:25: kg/ha were on a par with each other and recorded significantly higher seed cotton yield than 40:20:20 kg/ha. Similar type of results were observed in halo length with the fertilizer application.

Varieties: Both the varieties did not differ in respect of yield attributes and seed cotton yield/ha. However the V₂ (PH 348) produced quality fibre than V₁ (NH 545).

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Effect of fertilizer levels: The increasing level of NPK (40:20:20, 50:25:25 and 60:30:30: kg/ha) increased the growth characters viz plant height and dry matter/plant

Table 3. Rainfall distribution during crop growth period

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Rainfall (mm)	75.2	420.1	140.8	21.9	15.2	0	0	7.9	734.8				