

Effect of different plant spacings and nitrogen levels on deshi cotton hybrid

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ABSTRACT

A field investigation was conducted on clay soils of Department of Agronomy, Marathwada Agricultural University, Parbhani during *Kharif* season 2007-08 to study the effect of different plant spacing and nitrogen levels on deshi cotton hybrid. The 9 treatments comprised of three spacings and three nitrogen levels. The experiment was laid out in factorial randomized block design with three replications. On the basis of results obtained from present investigation it was concluded that lowest plant spacing (90 x 60 cm) gave more seed cotton yield 2670.40 kg/ha over its highest levels of spacing. Application of 80 kg N/ha significantly gave more seed cotton yield 2834.40 kg/ha over 60 kg N/ha and was at par with 100 kg N/ha.

Jagtap, D.N. and Bhale, V.M. (2011). Effect of different plant spacings and nitrogen levels on deshi cotton hybrid. *Internat. J. agric. Sci.*, 7(1): 123-125.

Key words : Plant spacing, Nitrogen levels, Yield, Cotton

INTRODUCTION

Cotton, the kind of apparel fiber since time immemorial has played a vital role in history and civilization of mankind. Commercially cotton is best export earning commodity in the country. The area under cotton in India is 91.32 lakh hectares with production of 270 lakh bales and productivity 503 kg lint per hectare (Anonymous, 2006). Productivity of cotton in India is lagging far behind the world average. *Gossypium arboreum*, species of cotton is most widely distributed in the country. The present *arboreum* species are mostly indeterminate in habit and their plant phenology make it difficult for management including cotton picking. The hybrids have higher yield potential and may produce different phenology which permit better management including cotton picking. Recently some private companies have developed *arboreum* hybrids but its phenological requirement and nutrient particularly nitrogen is the present need to increase productivity and sustainability of cotton. Considering the above points in view, present investigation undertaken.

MATERIALS AND METHODS

The experiment was conducted at the research farm of Department of Agronomy, Marathwada Agricultural University, Parbhani during *Kharif* season of 2007-08. The experiment was laid out in Factorial Randomized Block Design with three replications. There were 9 treatment combinations. The combination of three spacings *viz.*, 90 x 60, 90 x 75 and 90 x 90 cm² and three

nitrogen levels *viz.*, 60, 80 and 100 kg/ha were included. The cotton variety MRDC 227 was used. The crop was sown by dibbling with two cotton seeds per hill. The fertilizers were applied as per treatments. Half dose of nitrogen through urea and complete dose of P₂O₅ and K₂O was applied through 'Suphala' as a basal application by ring method at the time of sowing. Top dressing of remaining half dose of nitrogen was given after 36 days after sowing through urea by ring method. Other cultural practices and plant protection measures were given according to the recommended package of practices. At maturity, the observations on ancillary characters were recorded on five randomly selected plants in each plot. The total yield/ha was recorded on net plot basis.

RESULTS AND DISCUSSION

The findings of the present study as well as relevant discussion have been summarized under following heads:

Effect of plant spacing:

Various plant spacings influenced the plant height (Table1). Maximum height (242.89 cm) was found at higher plant population (90 x 60 cm). It is evident from that plant spacing *i.e.* 90 x 90 cm recorded maximum dry matter accumulation per plant (388.91 g) as against 371 g under plant spacing of 90 x 60 cm. Similar results were reported earlier by Ram and Giri (2006). The sympodial branches per plant (34.24) were found more at higher plant spacing (90 x 90 cm). This is in confirmation of

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Table 1 : Mean height (cm) of cotton as influenced by various treatments at different growth stages

Treatments	Days after sowing						
	30	60	90	120	150	180	At harvest
Spacing (cm)							
S ₁ – 90 x 60	18.84	155.74	190.78	212.00	229.11	240.56	242.89
S ₂ – 90 x 75	18.67	152.52	188.71	208.88	256.77	237.06	239.71
S ₃ – 90 x 90	17.54	149.80	185.76	204.40	220.19	233.00	236.78
S.E. ±	0.32	1.06	0.70	1.53	1.36	1.07	1.40
C.D. (P=0.05)	NS	3.19	2.10	4.60	4.10	3.21	4.19
Nitrogen (kg/ha)							
N ₁ – 60	18.02	145.17	182.77	204.83	221.50	231.21	235.54
N ₂ – 80	18.12	151.53	188.26	209.00	224.84	237.84	239.83
N ₃ – 100	18.92	161.37	194.22	211.44	229.72	241.56	244.00
S.E. ±	0.32	1.06	0.70	1.53	1.36	1.07	1.40
C.D. (P=0.05)	NS	3.19	2.10	4.60	4.10	3.21	4.19
Interaction (S x N)							
S.E. ±	0.56	1.84	1.21	2.66	2.37	1.86	2.42
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS
General mean	18.35	152.69	188.41	208.42	225.35	236.87	239.79

NS=Non-significant

Table 2 : Yield contributing characters and yield of cotton (kg/ha) in different treatments

Treatments	Number of picked bolls per plant	Yield per plant (g)	Boll weight (g)	Yield (kg/ha)
Spacing (cm)				
S ₁ – 90 x 60	32.29	149.20	4.58	2670.40
S ₂ – 90 x 75	38.56	182.02	4.59	2622.40
S ₃ – 90 x 90	44.97	213.07	4.59	2568.70
S.E. ±	1.40	6.49	0.0081	99.03
C.D. (P=0.05)	4.20	19.44	NS	NS
Nitrogen (kg/ha)				
N ₁ – 60	36.69	166.64	4.46	2409.90
N ₂ – 80	41.40	195.04	4.61	2834.40
N ₃ – 100	37.73	182.60	4.71	2617.20
S.E. ±	1.40	6.49	0.0081	99.03
C.D. (P=0.05)	NS	19.44	0.024	296.45
Interaction (S x N)				
S.E. ±	2.43	11.25	0.014	171.53
C.D. (P=0.05)	NS	NS	NS	NS
General mean	38.60	181.42	4.59	2620.50

NS=Non-significant

results represented by Bastia (2000). The increase in picked bolls and seed cotton yield per plant was observed with higher plant spacing (90 x 90 cm). Similar results were reported by Katore *et al.* (2006) and Nehra and Kumawat (2003). The seed cotton yield at closer spacing was increased may be due to high plant density, which was responsible to harvest more bolls per unit area reflected in increased in yield (Table 2). Similar findings

were reported earlier by Ram and Giri (2006).

Effect of nitrogen:

Plant height was profoundly influenced by every increase in level of nitrogen (Table 1). The maximum height of 244 cm was obtained at 100 kg N/ha while it was low (235.4 cm) at lower level of nitrogen. The number of functional leaves per plant increased as fertility

level increased. This could be due to particularly more number of branches per plant as observed under higher fertilizer level attributed to more number of internodes as reflected from more height and so more number of functional leaves per plant. Total dry matter production was increased with increase in nitrogen doses and maximum was achieved at 100 kg N/ha. Similar results were reported by Katkar *et al.* (2000). The monopodia and sympodia increased with highest levels of nitrogen. Similar results were obtained by Thirumurugan *et al.* (1984). The increase in number of picked bolls per plant, yield per plant, boll weight and yield (kg/ha) were observed higher upto 80 kg N/ha and decreased further at 100 kg N/ha (Table 2). Similar results were reported by Sharma *et al.* (2001).

On the basis of results obtained from present investigation it was concluded that lowest plant spacing (90 x 60 cm) gave more seed cotton yield 2670.40 kg/ha over its highest levels of spacing. Application of 80 kg N/ha significantly gave more seed cotton yield 2834.40 kg/ha over 60 kg N/ha and was at par with 100 kg N/ha.

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Received : August, 2010; Accepted : October, 2010