

Research
Paper

Performance of growth attributes and quality parameters of deshi cotton hybrid to different plant spacings and nitrogen levels

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ABSTRACT

A field trial was conducted to study the effect of different plant spacings and nitrogen levels on growth attributes and quality parameters of deshi cotton hybrid during *Kharif*, 2007 on clay soils of Department of Agronomy, Marathwada Agricultural University, Parbhani (M.S.). 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 the plant spacing (90 x 90 cm) recorded maximum growth attributes values over lowest and highest levels of spacing. Application of 100 kg N/ha significantly gave maximum values of growth attributes over 60 kg N/ha and 80 kg N/ha. The most of the quality parameters didn't significantly differ due to different plant spacing and nitrogen levels except harvest index of the deshi cotton hybrid.

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Key words : Plant spacing , Nitrogen levels, Growth attributes, Quality parameters, Cotton

INTRODUCTION

Cotton is one of the most important commercial crop of India. It sustains the country's cotton textile industry which is the largest segment of organized industries in the country. It has significant contribution in Indian economy by earning more than 30 per cent of foreign exchange to the tune of 10-12 billion from export of cotton yarn, threads, fabrics, apparels and ready made ups etc. 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, 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, experiment was conducted to study the response of deshi cotton hybrid to plant densities and nitrogen levels during *Kharif* season of 2007-08.

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 were 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 were recorded on net plot basis.

RESULTS AND DISCUSSION

The results obtained from the present investigation have been discussed in the following sub heads :

Effect of plant spacing:

Data presented in Table 1 revealed that the maximum plant height (242.89 cm) was observed at plant spacing of 90 x 60 cm followed by 90 x 75 cm and 90 x 90 cm at harvest. At harvest, spacing 90 x 90 cm produced significantly more number of leaves than 90 x 75 cm which was significantly superior to 90 x 60 cm. At harvest, mean leaf area at spacing 90 x 90 cm was significantly higher than 90 x 75 cm and 90 x 60 cm spacing. The mean leaf area at spacing 90 x 75 cm and 90 x 60 cm were at par with each other. At harvest, spacing 90 x 90 cm produced significantly higher dry matter than 90 x 60 cm. Similarly, 90 x 75 cm spacing recorded significantly more dry matter than 90 x 60 cm. Similar results were reported earlier by Ram and Giri (2006).

Data on quality parameters *viz.*, ginning percentage, halo length, lint index, seed index, earliness index and

harvest index are given in Table 2, which indicated that the spacing has no significant effect except harvest index. Spacing did not show significant effect on ginning percentage. Halo length was not differed significantly due to spacing. Higher values of halo length was observed at 90 x 75 cm and lowest with 90 x 60 cm. The differences in lint index due to spacings were not significant. However, higher values were recorded with 90 x 90 cm spacing.

Seed index was not differed significantly due to spacing. However, maximum seed index was noticed with 90 x 90 cm. Earliness index was not affected significantly due to spacings under study. However, spacing 90 x 90 cm recorded higher value of earliness index. Spacing of 90 x 90 cm recorded significantly higher harvest index than 90 x 75 cm and 90 x 60 cm. Similarly, 90 x 90 cm spacing recorded significantly more harvest index than 90 x 60 cm. The results are in conformity to those noted earlier by Abraham *et al.* (1991), Wankhede (1992) and Tomar *et al.* (2002).

Effect of nitrogen:

At harvest 100 kg N/ha recorded maximum plant height which was at par with 80 kg N/ha and was found significantly superior to 60 kg N/ha. The plant height at 80 kg N/ha was significantly superior to 60 kg N/ha. At harvest, application of 100 kg N/ha produced significantly maximum number of leaves, maximum leaf area and higher dry matter than 80 kg N/ha which was significantly superior to 60 kg N/ha. These results are in line to those reported by Katkar *et al.* (2000).

Data on quality parameters *viz.*, ginning percentage,

Table 1: Mean growth parameters of cotton as influenced by various treatments at harvesting stage of the crop

Treatments	Plant height (cm)	No. of leaves	Mean leaf area (sq.dm.)	Total dry matter (g)
Spacing (cm)				
S ₁ – 90 x 60	242.89	11.58	13.04	356.11
S ₂ – 90 x 75	239.71	13.11	13.26	357.56
S ₃ – 90 x 90	236.78	14.72	15.33	370.78
S.E. ±	1.40	0.80	0.35	2.78
C.D. (P=0.05)	4.19	2.40	1.05	8.33
Nitrogen (kg/ha)				
N ₁ – 60	235.54	10.30	10.57	346.64
N ₂ – 80	239.83	12.94	13.32	356.13
N ₃ – 100	244.00	16.17	17.47	381.67
S.E. ±	1.40	0.80	0.35	2.78
C.D. (P=0.05)	4.19	2.40	1.05	8.33
Interaction (S x N)				
S.E. ±	2.42	1.39	0.60	4.82
C.D. (P=0.05)	NS	NS	NS	NS
General mean	239.79	13.13	13.87	361.48

Table 2: Mean quality parameters of cotton as influenced by various treatments

Treatments	Ginning (%)	Halo length (mm)	Lint index	Seed index	Earli-ness index	Harvest index
Spacing (cm)						
S ₁ – 90 x 60	42.12	25.74	6.37	8.76	0.68	0.38
S ₂ – 90 x 75	42.10	25.91	6.36	8.75	0.68	0.48
S ₃ – 90 x 90	42.33	25.78	6.45	8.80	0.69	0.56
S.E. ±	0.69	1.03	0.31	0.31	0.035	0.019
C.D. (P=0.05)	NS	NS	NS	NS	NS	0.057
Nitrogen (kg/ha)						
N ₁ – 60	42.06	26.21	6.41	8.27	0.73	0.45
N ₂ – 80	42.25	25.79	6.42	8.78	0.68	0.45
N ₃ – 100	42.23	25.43	6.36	9.25	0.64	0.52
S.E. ±	0.69	1.03	0.31	0.32	0.035	0.019
C.D. (P=0.05)	NS	1.68	NS	NS	NS	0.057
Interaction (S x N)						
S.E. ±	1.20	1.78	0.54	0.54	0.061	0.033
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS
General mean	42.18	25.81	6.39	8.76	0.68	0.47

NS=Non-significant

halo length, lint index, seed index, earliness index and harvest index are given in Table 2, which indicated that the nitrogen levels had no significant effect except harvest index. Data presented in Table 2 indicated that nitrogen had not significant effect on ginning percentage. However, higher ginning percentage was noticed at 80 kg N/ha. Nitrogen levels did not show any significant effect on halo length. However, higher value of halo length was noticed at 80 kg N/ha. The differences in lint index due to nitrogen levels were not significant. The maximum lint index was noticed at 80 kg N/ha and lowest with 100 kg N/ha. The differences in seed index due to different nitrogen levels were not significant. Application of 100 kg N/ha recorded higher seed index than other levels of N. Nitrogen levels did not produce significantly effects on earliness index. However, 80 kg N/ha produced higher value of earliness index. Application of 100 kg N/ha produced significantly higher harvest index than 60 and 80 kg N/ha. The later two were at par with each other. The results are in conformity to those noted earlier by Abraham *et al.* (1991), Wankhede (1992) and Tomar *et al.* (2002).

Interaction effects:

The interaction effect of spacing and nitrogen was found non significant.

Conclusion:

The plant density of different spacing (90 x 60 cm, 90 x 75 cm and 90 x 90 cm) have shown significant effect on various growth characters *i.e.* plant height, number of functional leaves, mean leaf area per plant, dry matter

weight per plant. Application of 60, 80 and 100 kg nitrogen per hectare increased the growth characters substantially *viz.*, plant height, number of functional leaves, leaf area, dry matter per plant were increased as nitrogen level increased. The plant spacing and nitrogen had no significant improvement in quality of deshi cotton hybrid.

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