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Growth and Yield of Upland Cotton (*Gossypium hirsutum* L.) as Affected by Sowing Dates and Plant Spacings

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Abstract

A field experiment was conducted during the *kharif* season of 2001 and 2002 to study the effect of dates of sowing and plant spacings on growth and yield of American cotton. The experiment was laid out in split plot design with five sowing dates (February 25, March 15, April 5, April 25 and May 15) in main plots and three plants spacings (30, 45 and 60 cm) in sub-plots with four replications. In second year of study, February 25 date of sowing was deleted from the treatments. Highest seed cotton yield (21.9 and 30.7 q/ha) was recorded by March 15 sowing crop during both the years which was 64.7 and 30.6% more than that of crop sown on May 15. The crop sown on March 15 yielded more because of more number of sympodial branches and bolls per plant in earlier dates of sowings. Sowing dates of February 25, March 15 and April 5 were at par with each other but recorded significantly more yield than the later sowing dates of April 25 and May 15. Wider spacing recorded more number of sympods and bolls per plant but no significant difference was noted among the three spacings tested for seed cotton yield on per unit area basis.

Key words : Cotton, Growth, Yield, Sowing dates, Plant spacing.

During recent years, cotton crop has experienced a decline in productivity in Punjab state. Amongst various factors responsible for this decline, poor plant stand, excessive vegetative growth, shedding of young fruiting bodies and heavy pest attack which necessitates the farmers to follow rigid and costly spray schedule. Advancement of sowing date and manipulations of plant spacing can prove helpful in combating these problems. The early sown crop escapes the pest attack of American bollworm and whitefly which occurs late in the season. Thus, by advancing the sowing date, a pest escape mechanism can be formed which is highly desirable under present situation. The early sowing provides enough time for the plants to grow vegetatively resulting in vigorous growth, which is a pre-requisite for better reproductive development. El Shahawy (1) reported more yield in early sown crop due to more number of sympods per plant, more number of bolls per plant and more boll weight. Plant spacing has a great influence on growth, development and final yield of seed cotton (2). Wider spacing besides saving the seed, slao checks the pest proliferation, which is more common in closer spaced plants. It also reduces the competition among plants for growth factors and facilitates intercultural and plant protection measure. Chhabra and Bishnoi (3) observed that the wider spacing recorded more number of bolls per plant and boll weight than the closer spacing. Keeping in view the above mentioned points the present study was planned to see the effect of sowing dates and plant spacings on growth and yield of crop.

Methods

The experiment was carried out at the Research Farm, Department of Agronomy and Agrometeorology, Punjab Agricultural University, Ludhiana during *kharif* seasons of 2001 and 2002. The experimental site had loamy sand soil low in available nitrogen (188 kg N/ha) and medium in available phosphorus (16.2 kg P/ha) as well as available potassium (240 kg K/ha). The experiment was laid out in split plot design with four replications keeping five sowing dates (February 25, March 15, April 5, April 25 and May 15) in main plots. Three plants spacings viz. 67.5 × 30 cm, 67.5 × 45 cm and 67.5 × 60 cm were kept in sub-plots. Nitrogen at the rate of 75 kg N/ha as urea was applied

Table 1. Effect of different dates of sowing and plant spacings on growth and yield of American cotton.

Treatments	Plant height (cm)		Monopods/ plant		Sympods/ plant		Bolls per plant		Total seed cotton yield (q/ha)	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
Sowing dates										
Feb 25	166.4	–	3.3	–	46.9	–	45.3	–	21.1	–
Mar 15	166.1	163.5	2.9	4.5	42.2	38.4	44.5	50.2	21.9	30.7
Apr 5	160.1	145.2	2.4	3.9	36.7	36.1	45.9	48.6	21.5	26.9
Apr 25	130.2	145.5	2.6	3.6	33.0	34.0	37.3	39.6	17.6	25.8
May 15	119.2	131.4	2.6	3.2	28.3	29.5	31.1	34.3	13.3	23.5
CD	12.5	11.79	0.6	0.6	5.4	6.0	4.1	6.39	2.0	3.1
Spacings (cm)										
67.5 × 30	153.2	149.6	2.3	3.5	33.2	32.0	38.4	40.1	19.8	27.1
67.5 × 45	148.8	144.2	2.8	3.9	37.9	33.9	39.7	42.1	19.1	25.9
67.5 × 60	143.4	145.4	3.2	4.0	41.2	37.6	44.4	47.3	18.3	27.1
CD	NS	NS	0.4	0.5	3.4	3.2	3.6	5.2	NS	NS

as side dressing in two equal splits, first at the time of thinning after first irrigation and second at the time of flower initiation. Phosphorus at the rate of 30 Kg P_2O_5 per ha as single superphosphate was applied with last ploughing at the time of seed bed preparation. Irrigations were given based on the necessity of the crop and the required plant protection measures were taken. The crop was raised following the recommended cultural practices.

Results and Discussion

Effect of Sowing Dates

Plant height decreased with delay in sowing. In 2001, the height of the crop sown on February 25, March 15 and April 5 were at par but had significantly more plant height than the crop sown later. The trend was also the same with crop sown on March 15 during 2002 which had significantly more height than the rest of sowing dates.

Early dates of February 25 and March 15 in 2001 and March 15 in 2002 had higher number of monopodial branches per plant which were significantly better than later sowing dates. For number of sympods per plant, the sowing dates of February 25 and March 15 were significantly better than later sowing date in 2001, while in 2002 the sowing dates of March 15, April 5 and April 25 were significantly better than the later sowing date of May 15. The sowing date of February 25, March 15 and April 5 in 2001 and March 15 and April 5 in 2002 recorded significantly more number of bolls per plant than the later dates. Sowing dates had no significant effect on boll weight in both the years.

In case of total seed cotton yield, the crop sown on earlier dates of February 25, March 15 and April 5 were at par for seed cotton yield but recorded more yield than later dates of April 25 and May 15. The crop sown on March 15 recorded 24.4 and 64.7% more yield than the crop sown on April 25 and May 15, respectively. In 2002 also, the seed cotton yield decreased with delay in sowing. Crop sown on March 15 produced significantly more yield than the rest of the sowing dates. It recorded 14.5, 19 and 30.6% more yield than the sowing dates of April 5, April 25 and May 15, respectively. The higher yield recorded in earlier sowing dates was because the earlier sown crop benefited from more suitable conditions for balanced plant growth as evident from more plant height, more number of monopods and sympods and more number of bolls per plant in both the years. The results confirm the findings of Ansari et al. (4) and Khan et al. (5).

Effect of Plant Spacing

Plant spacing had a significant effect on plant height during both the years. Crop sown at 60 and 45 cm spacing were at par but recorded significantly more

number of monopods per plant than 30 cm spacing in 2001. In 2002, the plant spacing of 60 cm recorded more number of monopods than both 45 and 30 cm spacing. Similarly, significantly more number of sympods per plant and bolls per plant was recorded by wider spacing of 60 cm in both the years. But the plant spacing had no significant effect on boll weight and total seed cotton yield. Plants sown at the wider spacing had significantly more number of monopods and sympods per plant and boll per plant because of less competition amongst the plants for growth factors. But because of lesser number of plants per unit area, it failed to show any significant increase in total seed cotton yield per hectare over closer spacing. Similar results were reported by Tomar et al. (6).

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