

Research
Paper

Response of Bt cotton hybrids to different plant spacing under rainfed condition

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ABSTRACT

The field experiment was conducted at Department of Agronomy, Marathwada Agricultural University, Parbhani during the *Kharif* season, 2008-09 to find out the response of Bt cotton hybrids to different plant spacings. The plant spacing of 90 x 60 cm recorded highest seed cotton yield (SCY) which was significantly superior over plant spacing 150 x 30 cm and 180 x 30 cm and also at par with spacing of 120 x 45 cm. Plant spacing of 120 x 45 cm and 150 x 30 cm recorded at par SCY. The plant spacing 180 x 30 cm recorded significantly lowest SCY. Among the three Bt cotton hybrids Ajit 155 Bt, recorded significantly higher SCY than Bunny Bt and RCH 2 Bt.

Pendharkar, A.B., Solunke, S.S., Sawargaonkar, G.L. and Kote, G.M. (2010). Response of Bt cotton hybrids to different plant spacing under rainfed condition, *Adv. Res. J. Crop Improv.*, 1 (2) : 180-182.

Key words : Plant spacing, Bt cotton hybrids, SCY

INTRODUCTION

Cotton (*Gossypium hirsutum*) is important fiber crop of global significance and cultivated in tropical and subtropical regions of more than seventy countries of the world. Cotton plays key role in the national economy in terms of both employment generation and foreign exchange earnings. The transgenic cotton era has dawned in our country with the approval accorded by GEAC (Genetic Engineering Approval Committee) for the commercial cultivation of Bt. cotton hybrids in central and southern zones from 2002 crop season onwards. Performance of Bt cotton hybrids varies from region to region with changing agro climatic conditions, crop nutrition, pest pressure and management. Today transgenic cotton hybrids are becoming popular among the farming community because of the protection from the bollworm menace at reduced cost besides being environmentally safe. Apart from the likelihood of reduction in insecticide use by at least 50 to 75 per cent, it is also expected to ensure favourable ecological, economical and sociological returns in contrast to the harmful effects due to large scale use of insecticides (Kranti, 2002). Among the various factors influencing production of Bt cotton hybrids, spacing

play a very significant role and needs to be confirmed for various Bt type of cotton hybrids. The present study was therefore, planned to be carried out to know the yield potential of Bt hybrids at various plant spacings.

MATERIALS AND METHODS

A field experiment was conducted during *Kharif* season of 2008-09 at Department of Agronomy, Marathwada Agricultural University, Parbhani, during the *Kharif* 2008, the total rainfall of 629.5 mm was received (23rd MW to 6th MW) in 41 rainy days. The experiment was laid out in split plot design with four spacings (S_1 - 90 x 60 cm, S_2 - 120 x 45 cm, S_3 - 150 x 30 cm and S_4 - 180 x 30 cm) as main plot treatments and three Bt cotton hybrids (V_1 - Bunny Bt, V_2 - Ajit 155 Bt and V_3 - RCH 2 Bt) as sub plot treatments, replicated thrice. The experimental field was clayey (56.20 %) in texture with low in available nitrogen (110 kg/ha), moderately high in available phosphorus (22.56 kg/ha) and rich in available potash (425.50 kg/ha), medium in organic carbon content (0.53 per cent). The sowing was undertaken in the last week of June. Sowing was done by dibbling method. All the intercultural operations were done as per the

recommendations at proper time. The agronomic data during crop season were recorded on plant height (cm), monopodias/plant, sympodias/plant, dry matter accumulation/ plant, SCY/plant, boll weight and SCY (kg/ha).

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been presented below :

Effect of plant spacing:

Among various spacings, significantly higher SCY was recorded in plant spacing 90 cm x 60 cm (1760 kg/ha) over 150 cm x 30 cm (1648 kg/ha) and 180 cm x 30 cm (1479 kg/ha) and was also at par with spacing of 120 cm x 45 cm (1706 kg/ha). Similarly, plant spacing of 120 cm x 45 cm and 150 cm x 30 cm recorded at par SCY. However, the lowest SCY was recorded with the plant spacing of 180 cm x 30 cm. Similar results were reported by Buttar and Singh (2007) and Anand *et al.* (2008).

As regards to plant height, maximum height was found at plant spacing 180 cm x 30 cm. As the competition for solar radiation was existed among the plants which rush for more solar radiation for the process of photosynthesis and thus plant produced more plant height

in search of light. This is confirmation of results represented by Ram and Giri (2006) and Singh *et al.* (2007). Plant spacing 90 cm x 60 cm recorded significantly highest total dry matter production than other plant spacing. Similar results were reported earlier by Ram and Giri (2006). Sympodial branches per plant were significantly superior in plant spacing 90 cm x 60 cm than other plant spacings. This is confirmation of results represented by Butter and Singh (2007).

Boll weight (g) and monopodias/plant were not influenced significantly by different plant spacing. Similar results were quoted by Buttar and Singh (2006) wherein they observed that growth attributes, monopodias per plant as well as yield contributing characters like boll weight were not influenced by different plant spacing

Effect of Bt hybrids:

Among the Bt cotton hybrids, RCH 2 Bt exhibited significantly lowest plant height over all other hybrids. Similarly, number of sympodias was also higher in Ajit 155 Bt as compared to Bunny Bt and RCH 2Bt. Amongst the Bt cotton hybrids under study, Ajit 155 Bt recorded significantly highest SCY than Bunny Bt and RCH 2 Bt. RCH 2 Bt recorded significantly lowest SCY as compared to other hybrids. The significantly highest and lowest boll weight and SCY per plant were recorded in Bt cotton hybrids Ajit 155 Bt and RCH 2 Bt, respectively.

Table 1: Effect of different plant spacing on SCY and other characters of Bt cotton hybrids

Treatments	Plant height (cm)	Mono-podial branches	Symp-podial branches	Boll weight (g)	Dry matter accumulation per plant (g)	Yield per plant (g)	SCY (kg ha ⁻¹)
Plant spacing (cm)							
S ₁ - 90 x 60	123.03	1.69	19.99	4.02	147.22	107.16	1760
S ₂ - 120 x 45	125.07	1.64	19.70	3.89	143.00	105.73	1706
S ₃ - 150 x 30	128.06	1.52	18.43	3.85	133.11	97.13	1648
S ₄ - 180 x 30	130.04	1.42	18.23	3.81	128.00	94.66	1479
S.E. ±	1.19	0.08	0.34	0.16	0.61	0.55	32.51
C.D. (P=0.05)	3.57	NS	1.17	NS	1.84	1.63	97.43
Bt hybrids							
V ₁ - Bunny Bt	126.55	1.54	19.03	3.79	136.92	126.55	1648
V ₂ - Ajit 155 Bt	129.07	1.64	19.99	4.10	142.83	129.07	1832
V ₃ - RCH 2 Bt	124.03	1.52	18.24	3.78	133.75	124.03	1464
S.E. ±	0.54	0.09	0.36	0.10	0.59	0.54	19.09
C.D. (P=0.05)	1.60	NS	1.06	0.30	1.75	1.60	57.22
Interaction (SxV)							
S.E. ±	1.07	0.17	0.71	1.28	1.17	1.07	38.19
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS
General mean	126.55	1.57	19.09	101.17	137.83	126.55	1648

NS=Non-significant

All the interaction effects were found to be non significant.

In nut shell, it can be inferred that among Bt cotton hybrids subjected to various spacings under study, Ajit 155 Bt at a spacing of 90 cm x 60 cm recorded significantly higher yield attributes and thereby SCY as compared to rest of the treatment combinations.

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