

## Growth and Seed Cotton Yields of Cotton Hybrids as Influenced by Bt Cotton Hybrids

**Key words :** Bt, Cotton, Hybrids

Cotton plays an important role in Indian economy. Though India is largest cotton grower, the productivity ( $440 \text{ kg ha}^{-1}$ ) is very low which is less than the world's average productivity (Anonymous, 2008). In cotton production, boll worm damage causes serious yield reduction; Genetically modified cotton, otherwise known as "Bt cotton" offers greater resistance to most important insect pest of cotton *i.e.*, bollworm. There is an increasing demand among the cotton growers to take up commercial cultivation of Bt cotton in A.P. Hence, it is essential to know whether the agronomic practices that are presently recommended for commercial cotton hybrids also hold good for Bt cotton hybrids or not. Therefore, the present investigation was taken up to study the performance of Bt cotton hybrids in comparison with a non-Bt hybrid under different plant densities.

A field experiment was conducted on clay loam soil of the Agricultural College Farm, Bapatla to study the performance of Bt cotton hybrids under different planting densities on productivity of cotton during kharif 2006-07. The experiment was laid out in a randomised block design with factorial concept and replicated thrice. The treatments consisted of four cotton hybrids (RCH-20 Bt, Mallika Bt, Bunny Bt and Bunny non-Bt) and four planting densities ( $13,889$ ;  $18,518$ ;  $27,778$  and  $37,037 \text{ plants ha}^{-1}$ ). The crop was sown on 23.8.2006 as per treatments of spacing and hybrids by following standard package of practices. A quantity of  $120-60-60 \text{ kg NPK ha}^{-1}$  was applied. Nitrogen was applied in three splits at 30, 60 and 90 DAS while entire  $\text{P}_2\text{O}_5$  was applied as basal and  $\text{K}_2\text{O}$  was applied in three splits at 30, 60 and 90 DAS. All the fertilizers were applied by pocketing method. The crop was raised purely under rainfed conditions except two irrigations were given at flowering and boll development stages to protect the crop from moisture stress. A total of three pickings were taken up during the entire crop season. Data on plant height, dry matter production, number of sympodial branches, number of picked bolls  $\text{plant}^{-1}$ , boll weight were averaged from 5 plants. The data on seed cotton yield ( $\text{kg ha}^{-1}$ ) and other biometric data were analysed statistically as per Panse and Sukhatme (1978).

The results indicated that the interaction effect of cotton hybrids and plant densities was not significant in respect of all the characters studied. All the Bt cotton hybrids recorded significantly higher DMP, sympodia, picked bolls, boll weight, seed cotton yield, net returns and BC ratio than Bunny non-Bt hybrid. RCH-20 Bt recorded significantly highest number of picked bolls  $\text{plant}^{-1}$ , boll weight and this, in turn resulted in higher seed cotton yield than the remaining Bt cotton hybrids (Table 1). Mallika Bt and Bunny Bt hybrids recorded significantly higher cotton seed yield  $\text{ha}^{-1}$  over RCH 20 Bt and Bunny non Bt hybrid. It might be due to their genetic differences among cotton hybrids as reported earlier by Raut *et al.*, (2005) and Buttar and Paramjit Singh (2006). Though higher density of  $37,037 \text{ plants ha}^{-1}$  produced significantly taller plants, lowest density of  $13,889 \text{ plants ha}^{-1}$  recorded significantly higher DMP, sympodia and picked bolls per plant and boll weight (Table 1). By widening space in between plants recorded higher plant height and exhibited increasing trend even in respect of other growth parameters when inter row spacing kept same. Similarly, wider row spacing recorded significantly more number of bolls per plant (Table 1). These findings are in conformity with those reported by Narayana *et al.*, (2007).

Higher plant density ( $37,037 \text{ plants ha}^{-1}$ ) produced higher seed cotton yield ( $3820 \text{ kg ha}^{-1}$ ) which was significantly superior to remaining plant densities (Table 2). However, the lowest plant density ( $13,889 \text{ plants ha}^{-1}$ ) produced least seed cotton yield. The per cent increase in seed cotton yield due to plant densities of  $37,037$ ;  $27,778$  and  $18,518 \text{ plants ha}^{-1}$  was 88.1, 69.1 and 17.4 % respectively over  $13,889 \text{ plants ha}^{-1}$ . The lesser yield recorded  $\text{plant}^{-1}$  with highest plant density was compensated by increased number of plants and their yield contributory factors per unit area. Therefore, the highest plant density gave maximum yield compared to lower plant density. The results are in concurrence with findings of Hake *et al.*, (1992) Solanke *et al.*, (2001), Raut *et al.*, (2005) and Srinivasan (2006)..

From the present investigation, it is concluded that cultivation of Mallika Bt hybrid with the adoption

Table 1. Response of cotton hybrids to different plant densities.

| Treatments                                  | Plant height (cm) at harvest | Dry matter production (g)/plant at harvest | Sympodial branches (No) per plant | Picked bolls (No) per plant at harvest | Boll weight (g) at harvest | Seed cotton yield (kg/ha) |
|---|------------------------------|--|-----------------------------------|--|----------------------------|---------------------------|
| Hybrids                                     |                              |  |                                   |  |                            |                           |
| RCH- 20 Bt                                  | 155.4                        | 351.9                                      | 29.6                              | 38.5                                   | 4.7                        | 2706                      |
| Mallika Bt                                  | 158.2                        | 334.1                                      | 27.6                              | 41.1                                   | 5.1                        | 3162                      |
| Bunny Bt                                    | 148.2                        | 256.7                                      | 27.2                              | 38.4                                   | 4.9                        | 2997                      |
| Bunny non-Bt                                | 147.0                        | 277.5                                      | 27.2                              | 34.4                                   | 4.5                        | 2601                      |
| SE m $\pm$                                  | 3.82                         | 8.8  | 0.5                               | 0.66                                   | 0.09                       | 96.2                      |
| CD (P=0.05)                                 | NS                           | 25.4                                       | 1.4                               | 1.9                                    | 0.3                        | 278                       |
| Planting density (Plants ha <sup>-1</sup> ) |                              |  |                                   |  |                            |                           |
| 13,889                                      | 145.3                        | 336.4                                      | 30.9                              | 43.4                                   | 5.1                        | 1978                      |
| 18,518                                      | 149.4                        | 326.7                                      | 26.9                              | 38.6                                   | 4.8                        | 2323                      |
| 37,037                                      | 162.3                        | 252.1                                      | 24.8                              | 34.0                                   | 4.5                        | 3820                      |
| 27,778                                      | 151.7                        | 304.9                                      | 26.6                              | 36.4                                   | 4.7                        | 3345                      |
| SE m $\pm$                                  | 3.82                         | 8.8  | 0.5                               | 0.66                                   | 0.09                       | 96.2                      |
| CD (P=0.05)                                 | 11.0                         | 25.4                                       | 1.4                               | 1.9                                    | 0.3                        | 278                       |
| Interaction                                 |                              |  |                                   |  |                            |                           |
| SE m $\pm$                                  | 7.64                         | 17.6                                       | 1.0                               | 1.32                                   | 0.19                       | 192.5                     |
| CD (P=0.05)                                 | NS                           | NS   | NS                                | NS                                     | NS                         | NS                        |
| CV(%)                                       | 8.7                          | 9.9  | 6.2                               | 5.9                                    | 7.1                        | 11.6                      |

Table 2. Seed cotton yield (kg ha<sup>-1</sup>) of the cotton hybrids as influenced by planting density

| Treatments                                  | Actual yield (kg ha <sup>-1</sup> ) | Gross returns (Rs ha <sup>-1</sup> ) | Cost of cultivation (Rs ha <sup>-1</sup> ) | Net returns (Rs ha <sup>-1</sup> ) | B:C ratio |
|---|-------------------------------------|--------------------------------------|--|------------------------------------|-----------|
| Hybrids                                     |                                     |                                      |  |                                    |           |
| RCH-20 Bt                                   | 2706                                | 54,932                               | 22,737*                                    | 32,195                             | 1.41      |
| Mallika Bt<br>(NCS-207 Bt)                  | 3162                                | 64,189                               | 23,232*                                    | 40,957                             | 1.76      |
| Bunny Bt<br>(NCS-145 Bt)                    | 2997                                | 60,839                               | 22,762*                                    | 38,077                             | 1.70      |
| Bunny non-Bt<br>(NCS-145)                   | 2601                                | 52,800                               | 23,946**                                   | 28,854                             | 1.20      |
| Planting density (Plants ha <sup>-1</sup> ) |                                     |                                      |  |                                    |           |
| 13,889<br>(120 cm $\times$ 60 cm)           | 1978                                | 40,153                               | 18,726                                     | 21,427                             | 1.14      |
| 18,518<br>(90 cm $\times$ 60 cm)            | 2323                                | 47,157                               | 21,348                                     | 25,809                             | 1.21      |
| 37,037<br>(90 cm $\times$ 30 cm)            | 3820                                | 77,546                               | 27,445                                     | 50,101                             | 1.82      |
| 27,778<br>(60 cm $\times$ 60 cm)            | 3345                                | 67,903                               | 24,899                                     | 43,004                             | 1.73      |

of high plant density of 37,037 plants ha<sup>-1</sup> gave higher yield attributes and seed cotton yield and than the other hybrids and plant densities tested.

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Department of Agronomy  
Agricultural College  
Bapatla 522 101  
Andhra Pradesh

**P Krishna Veni  
Ch Pulla Rao  
G Subbaiah  
R Veeraraghavaiah  
K Srinivasulu**

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