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## Evaluation of Bt cotton hybrids for yield and fibre quality traits

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### Abstract

Most of the cotton cultivated area around 90 percent in India is covered with Bt cotton (BGII) hybrids. These BGII hybrids have been developed by various private companies. These hybrids are to be tested for their yield performance in a particular location for their adoption. Keeping this in view, a field experiment was conducted to evaluate sixteen intra-*hirsutum* Bt cotton hybrids including three Bt checks at Regional Agricultural Research Station, Lamfarm, Guntur, Andhra Pradesh in *Kharif* 2015-16 in Randomized block design with three replications. The analysis of data revealed significant differences between the Bt cotton hybrids for seed cotton yield. The seed cotton yield ranged from 2229 to 3051 kg/ha, whereas, the hybrids KSCH 212 BGII (3051 kg/ha), SWCH 7525 BGII (2809 kg/ha) and NCH 6022 BGII (2781 kg/ha) recorded significantly superior yield to Bt checks Bunny BG II (2330 kg /ha) and Mallika BG II (2277 kg/ha). Lint yield ranged from 715 to 997 kg/ha. Highest lint yield was recorded by the check JADOO BGII (1027 kg/ha). Highest number of bolls per plant was recorded by JAADOO BGII (64) followed by KSCH 212 BGII (56), CCH 06 BGII (56) and PCHH 6 (56). Seed index values ranged from 9.2 to 13.2 g. Highest value for seed index was recorded by VCH 314 BGII (13.2 g). Lint index values ranged between 5.4 to 6.2 g. The hybrid VCH 314 BGII recorded highest lint index (6.2 g) and recorded significant lint index over the check hybrid BUNNY BGII (5.7 g). Boll weight ranged from 3.8 g to 5.4 g, number of bolls ranged from 44 to 64, 2.5% span length from 26.7 mm to 33.6 mm, ginning out turn (GOT) ranged from 31.6% to 36.8%, micronaire values ranged from 4.1 to 5.1 and bundle strength from 21.0 g/tex to 24.8 g/tex. CCH 09 BGII (5.4 g) recorded highest boll weight followed by KCHH 2725 (5.3 g), whereas, maximum 2.5 % span length was observed in BUNNY BGII (33.6 mm) followed by SWCH 7677 BGII (32.7 mm). Highest bundle strength was recorded by Bunny BG II (24.8 g/tex) followed by SWCH 7525 BGII (23.8 g/tex). Maximum GOT was observed in PCHH 6 BGII (36.8 %) followed by CCH 03 BGII (35.8 %). It is clearly evident from this experiment that some Bt hybrids are really performing better both in terms of yield and fibre quality characters in this location.

**Keywords:** Bt Cotton, yield, fibre quality traits

### Introduction

Cotton is an important fibre crop and plays vital role as a cash crop in commerce of many countries such as USA, China, India, Pakistan, Uzbekistan, Australia and Africa. In India it occupies an area of about 10.5 million hectares and production of 35.1 million bales of cotton with an average productivity of 568 kg lint per hectare (AICRP, Annual Report, 2016-17). After the introduction of Bt cotton hybrids, there has been a significant change in the cotton cultivation scenario of India. Now, more than 90 percent area under cotton in India is occupied by Bt cotton hybrids. However, the average productivity is very low compared to world's average. This is mainly because 70 percent of cotton area is cultivated under rainfed conditions. Although, there are many number of Bt cotton hybrids were developed and released by private industry which are under cultivation in farmers fields, it is necessary and continuous process to evaluate for high yielding Bt cotton hybrids along with good fibre properties for specific locations. Hence, the present study was undertaken to identify the high yielding Bt cotton hybrids for Guntur.

### Materials and Methods

A field experiment was conducted during *Kharif*, 2015-16 at Regional Agricultural Research Station, Lam farm, Guntur, Andhra Pradesh. The present study was carried out with 16 Bt cotton hybrids along with three checks (BUNNY BGII, MALLIKA BGII and JADOO BGII) in Randomized Block Design (RBD) with three replications. The spacing adapted was 105 cm x 60 cm. Each plot consisted of four rows of 6 m length and observations were recorded on

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ten randomly selected plants from each genotype per replication for the characters *viz.*, number of bolls per plant, boll weight (g), seed index (g) and lint index (g) whereas, seed cotton yield (kg/ha), lint yield (kg/ha) 2.5% span length (mm), micronaire ( $10^{-6}$ g/inch), ginning out turn (GOT) and bundle strength (g/tex) were recorded on plot basis. Recommended dose of fertilizers and need based plant protection measures were carried out for the management of sucking pests to ensure a near perfect expression of the genotypes. Kapas was taken from the first picking and the lint was subjected to fibre quality testing at Central Institute for Research on Cotton Technology (CIRCOT) Regional Unit, Lam, Guntur.

## Results and Discussion

In the present investigation, analysis of data indicated significant differences between the Bt cotton hybrids for seed cotton yield which ranged between 2229 to 3051 kg/ha. Highest seed cotton yield was recorded by KSCH 212 BGII (3051 kg/ha). The hybrids *viz.*, KSCH 212 BGII (3051 kg/ha), SWCH 7525 BGII (2809 kg/ha) and NCH 6022 BGII (2781 kg/ha) recorded significantly superior yield than the two Bt checks BUNNY BG II (2330 kg /ha) and MALLIKA BG II (2277 kg/ha). None of the hybrids recorded significantly higher seed cotton yield than the check hybrid JADOO BGII (2998 kg/ha) except KSCH 212 BGII (3051 kg/ha) which showed numerically higher yield than JADOO BGII. Among the entries lint yield ranged from 715 to 1027 kg/ha. Highest lint yield was recorded by the check JADOO BGII (1027 kg/ha). None of the hybrids recorded significantly higher lint yield than the check JADOO BGII (1027 kg/ha). The hybrids *viz.*, KSCH 212 BGII (997 kg/ha) and NCH 6022 BGII (985 kg/ha) recorded significantly higher lint yield over both the checks BUNNY BGII (823 kg/ha) and MALLIKA BGII (811kg/ha). Number of bolls per plant ranged between 44 (NCH 6055 BGII) and 64 (JADOO BGII). Highest number of bolls per plant was recorded by check variety JADOO BGII (64) followed by CCH 06 BGII (56), KSCH 212 BGII (56) and PCHH 6 BGII (56). Boll weight ranged from 3.8 g (PCHH 6 BGII) to 5.4 g (CCH 09 BGII). The entry CCH 09 BGII recorded highest boll weight (5.4 g) followed by KCHH 2725 BGII (5.3 g), ACHH 55 BGII (5.2 g), SWCH 7525 BGII

(5.2 g) and CCH 03 BGII (5.2 g) compared with the checks *viz.*, BUNNY BGII (4.2 g), MALLIKA BGII (4.9 g) and JADOO BGII (4.4 g).

Seed index values ranged from 9.2 to 13.2 g. Highest value for seed index was recorded by VCH 314 BGII (13.2 g). The hybrids *viz.*, VCH 314 BGII (13.2 g), ACHH 55 BGII (12.8 g), KCHH 2739 BGII (12.1 g), NCH 6055 BGII (11.9 g), XN 132 BGII (11.4 g), KSCH 212 BGII (11.3 g), CCH 09 BGII (11.3 g), KCHH 2725 BGII (11.2 g) and SWCH 7525 BGII (11.2 g) illustrated significantly higher seed index over the three checks JADOO BGII (10.5 g), BUNNY BGII (10.5 g) and MALLIKA BGII (8.8 g). Lint index values ranged between 5.4 to 6.2 g. The hybrid VCH 314 BGII recorded highest lint index (6.2 g). The hybrid VCH 314 BGII (6.2 g) recorded significantly higher lint index over the check hybrids BUNNY BGII (5.7 g), JADOO BGII (5.5 g) and MALLIKA BGII (4.9 g).

For 2.5 % span length the values ranged from 28.2 mm to 33.6 mm. The entries *viz.*, BUNNY BGII (33.6 mm), SWCH 7677 BGII (32.7 mm), CCH 06 BGII (31.7 mm), SWCH 7525 BGII (31.7 mm) recorded highest 2.5% span length over the checks JADOO BGII (31.6 mm) and MALLIKA BGII (31.6 mm). Bundle strength ranged from 21.0 g/tex to 24.8 g/tex. The entries *viz.*, SWCH7525 BGII (23.8 g/tex), SWCH7677 BGII (23.7 g/tex), RCH 836 BGII (23.6 g/tex) and KSCH 211 BGII (23.6 g/tex) exhibited superior strength over the checks MALLIKA BGII (23.5 g/tex) and JADOO BGII (23.4 g/tex). Ginning out turn values ranged from 31.6 to 36.8 %. The entry PCHH 6 BGII recorded highest GOT (36.8%) over the checks BUNNY BGII (35.3%), MALLIKA BGII (35.7%) and JADOO BGII (34.2%). Micronaire values ranged from 4.1 to 5.1  $10^{-6}$ g/inch. The hybrids *viz.*, CCH 09 BGII (4.1  $10^{-6}$ g/inch), RCH 836 BGII (4.2  $10^{-6}$ g/inch) and KCHH 2725 BGII (4.2  $10^{-6}$ g/inch) exhibited desirable micronaire values.

The desirable hybrids in respect of seed cotton yield KSCH 212 BGII, SWCH 7525 BGII and NCH 6022 BGII were identified in the present investigation for this location. However it needs further confirmation on multilocation basis. Similar research studies on Bt cotton hybrids were also reported by (Siva Reddy *et al.* 2015) [7], (Deshmukh *et al.* 2015) [2], (Satish *et al.* 2015) [6], (Bhongle *et al.* 2013) [3], (Sangwan *et al.* 2013) [5] and (Patil *et al.* 2013) [4].

**Table 1:** Mean Seed cotton yield and fibre quality traits of different Bt cotton hybrids

S. No	Name of the Bt cotton hybrid	Seed Cotton Yield (kg/ha)	Lint Yield (kg/ha)	No. of Bolls	Boll weight (g)	Seed Index (g)	Lint Index (g)	Ginning Out Turn (%)	2.5 % Span Length (mm)	Bundle Strength (g/tex)	Micronaire ( $10^{-6}$ g/inch)
1	VCH 314 BGII	2229	770	49	4.3	13.2	6.2	33.9	30.0	22.8	4.9
2	ACHH 55 BGII	2582	876	48	5.2	12.8	5.9	31.8	28.4	23.2	4.4
3	SWCH 7677 BGII	2414	896	50	4.7	10.9	5.4	33.4	32.7	23.7	4.5
4	SWCH 7525 BGII	2809	898	49	5.2	11.2	5.2	32.0	31.7	23.8	4.6
5	PCHH 6 BGII	2357	866	56	3.8	9.2	5.3	36.8	26.7	21.0	4.4
6	RCH 836 BGII	2568	897	53	4.5	10.9	5.9	34.9	31.5	23.6	4.2
7	XN 132 BGII	2653	884	49	5.0	11.4	5.7	33.3	28.2	21.4	4.8
8	KSCH 211 BGII	2609	859	51	5.0	11.1	5.5	32.9	31.5	23.6	5.1
9	KSCH 212 BGII	3051	997	56	5.1	11.3	5.5	32.7	31.1	23.1	4.9
10	KCHH 2739 BGII	2565	792	51	4.8	12.1	5.7	32.1	28.5	22.1	4.9
11	KCHH 2725 BGII	2618	888	48	5.3	11.2	5.7	33.9	28.6	22.0	4.2
12	NCH 6055 BGII	2261	715	44	4.9	11.9	5.6	31.6	28.8	21.6	4.8
13	NCH 6022 BGII	2781	985	51	5.0	10.7	5.9	35.4	28.8	21.8	4.5
14	CCH 09 BGII	2590	896	46	5.4	11.3	5.9	34.6	30.5	23.0	4.1
15	CCH 06 BGII	2735	920	56	4.7	9.9	5.0	33.6	31.7	23.5	4.9
16	CCH 03 BGII	2446	875	46	5.2	10.9	6.1	35.8	28.2	21.8	4.5
17	JADOO BGII (C)	2998	1027	64	4.4	10.5	5.5	34.2	31.6	23.4	4.9
18	BUNNY BGII (C)	2330	823	54	4.2	10.5	5.7	35.3	33.6	24.8	4.1
19	MALLIKA BGII (C)	2277	811	45	4.9	8.8	4.9	35.7	31.6	23.5	4.6
	GM	2572	878	50.8	4.8	11.0	5.6	33.9	30.2	22.8	4.6
	CD (p=0.05)	421	148	5.9	0.29	0.57	0.46	1.08	1.45	1.24	0.32
	CV (%)	10.0	10.3	7.1	3.7	3.3	5.1	2.0	3.0	3.4	4.3

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