



Performance of Bt cotton against sucking pests

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ABSTRACT

Studies were taken up to monitor the population of sucking pests as well as boll damage in commercially released Bt cotton entries. In the present study it was found that the jassid population was almost negligible (< one per three leaves) both in Bt as well as non Bt cotton hybrids. In five Bt cotton hybrids (JKCH 1947, RCH 317, NCEH 6, Ankur 2534 and MRC 6301) it was less than that of non Bt cotton hybrid. However, whitefly incidence was more in all Bt cotton hybrids than that of the non Bt cotton hybrid, which may be due to reduction in the spray of chemical insecticides or the negligible infestation of bollworms. The bollworm damage in the current experiments revealed almost nil damage to the bolls in Bt cotton compared to non Bt cotton hybrid. The seed cotton yield in 12 out of 13 Bt cotton hybrids were more than that of non Bt cotton hybrid. This reveals the superiority of Bt cotton hybrids in terms of yield.

Keywords: Bt cotton, sucking pests, boll damage, seed production

INTRODUCTION

Transgenic Bt cotton has been adopted at an unprecedented pace in our country with the area crossing > 50 per cent (including unapproved variants) in just four years of commercialization. The area under Bt cotton tripled over just one year i.e. between 2005-06 and 2006-07. There have been substantial gain in terms of lint yield and we have crossed the targets set for 11th Plan by many folds. Though Bt cotton has been found successful in the management of bollworms, however, it has invited other insect pests especially sucking pests due to reduction in pesticide sprays at early stage. There is a need to monitor and take up control measures for the management sucking pests in Bt cotton. Keeping this in view these studies were taken up to monitor the population of sucking pests as well as boll damage in commercially released Bt cotton entries.

MATERIALS AND METHODS

This study was carried out in farmers' field at Rangri village, Sirsa district of Haryana. Thirteen commercially released Bt cotton hybrids such as were selected for this study along with one non Bt cotton hybrid. The experiment was laid out in a randomized complete block design with the fourteen treatments replicated twice. Each plot measured 9 X 5 m in size. They were sown in kharif 2006-07 and the regular agronomic practices were followed. The regular observations on sucking pests as well as boll damage was done at weekly intervals in all the hybrids. The sucking pests such as jassids and whitefly were observed from 10 plants on the lower side of three leaves

in each plant. The total number of bolls as well as damaged bolls were also counted to work out the per cent damaged bolls. The picking was done at the end and the seed cotton yield was calculated per hectare basis. The data were analysed using ANOVA (Analysis of Variance) procedure in RCBD analysis.

RESULTS

Among the sucking pests, jassids and whitefly were observed commonly in these Bt cotton hybrids. Jassid

Table 1. Cotton varieties on the population of jassids/3 leaves

Varieties	SMW		Mean*
	30	33	
RCH-134	1.98	1.98	0.59
Ankur-651	2.1	2.01	0.79
NCS-138	1.69	2.3	0.76
MRC-6304	2.58	2.5	0.88
RCH-314	1.98	1.98	0.65
NCS-913	2.01	2.1	0.79
RCH-308	1.84	2.6	0.82
JKCH-1947	1.9	2.4	0.74
RCH-317	1.7	2.2	0.74
NCEH-6	1.6	2.1	0.79
Ankur-2534	1.58	2.9	0.83
MRC_6301	1.23	2.4	0.72
MRC-6025	2.01	0.4	0.62
Non Bt cotton - Shresth	1.98	2.5	0.72
CD (P=0.05)	NS	NS	

SMW = Standard Meteorological Week, * denotes mean of observations from 29th to 40th SMW.

Table 2. Cotton varieties on the population of whitefly adults / 3 leaves.

Varieties	Standard Meteorological Week (SMW)								Mean*
	30	31	32	33	35	37	39	40	
RCH-134	1.6	2.6	1.3	2.2	1.2	3.2	1.2	1.32	1.61
Ankur-651	1.7	2.8	1.8	1.6	1.3	3.5	0.9	1.09	1.76
NCS-138	1.9	1.7	2	0.9	0.9	4.2	0.8	0.8	1.57
MRC-6304	0.98	3.2	2.1	3.2	1.8	2.9	1.2	1.2	1.99
RCH-314	2.6	3.9	2.3	2.8	1.6	4.6	1.6	0.3	2.30
NCS-913	1.6	1.7	2.4	1.69	2.3	4.98	1.3	0.98	2.01
RCH-308	3	0.9	0.8	2.5	2.7	3.9	2.5	1.3	2.19
JKCH-1947	1.1	2.4	2.35	2.33	2.5	3.87	2.6	1.56	2.29
RCH-317	2.6	1.8	3	3.4	1.69	2.98	2.2	1.69	2.24
NCEH-6	1.2	1.6	2.9	3.6	1.5	3.49	2.13	1.78	2.00
Ankur-2534	2.7	3.2	1.2	2.3	1.3	3.9	3.2	2.4	2.15
MRC_6301	1.4	2.2	0.8	2.98	1.67	1.2	1.9	2.3	1.60
MRC-6025	1.9	2.4	0.8	0.7	1.6	0.78	0.98	0.65	1.17
Non Bt cotton-Shresth	2.1	2.3	0.98	0.5	0.65	0.8	0.46	0.78	1.02
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	

Average of 10 plants. *Mean of observations from 29th to 40th SMW.

population was more than one per three leaves on 30th and 33rd standard meteorological week (SMW). In all the other periods of observation it was found to be less than one per three leaves. The maximum of 2.58 jassids per three leaves was noted on 30th SMW on MRC 6304 Bt cotton hybrid. The pooled mean in this hybrid was 0.88 per three leaves. The minimum pooled mean of 0.59 jassids per three leaves was observed in RCH 134 Bt cotton hybrids.

Table 3. Green boll damage (%) and seed cotton yield (q / ha)

Varieties	Standard Meteorological Week				Yield(q/ha)
	33	37	42	Mean	
Bt cotton					
RCH-134	0	0	0	0.00	29.6
Ankur-651	0	0	0	0.00	27.9
NCS-138	0	0	0	0.00	28.3
MRC-6304	0	0	0	0.00	40.4
RCH-314	0	0	0	0.00	34.6
NCS-913	0	0	0	0.00	31.2
RCH-308	0	0	0	0.00	34.6
JKCH-1947	0.64	0	0	0.21	27.1
RCH-317	0	0	0	0.00	32.5
NCEH-6	0	0	0	0.00	23.3
Ankur-2534	0	0	0	0.00	30.8
MRC_6301	0	0	0	0.00	37.1
MRC-6025	0	0	0	0.00	34.2
Non Bt cotton Shresth	0.2	2.14	0.65	1.00	25.4
CD (P=0.05)	NS	NS	NS		3.2

The whitefly population in general was found to be higher as compared to jassid population. Whitefly population remained higher on 31st, 33rd, 36th and 37th SMW, in which it crossed more than 3 whitefly adults per three leaves. Among all the entries NCS 913 recorded the maximum 4.98 adults per three leaves followed by RCH 314 on 37th SMW. Unlike jassid population the whitefly population almost remained less than one per three leaves in non Bt cotton hybrid Shresth, throughout the period of observation, except on 30th and 31st SMW. The pooled mean data revealed that the maximum population was noted on RCH 314 followed by JKCH 1947 (2.29) and RCH 317 (2.24). The minimum pooled mean of 1.02 adults per three leaves were noted in non Bt cotton hybrid shresth.

In contrast to the sucking pest populations, the bollworm damage was almost negligible in all the Bt cotton hybrids throughout the observation period, except that of JKCH 1947, which recorded 0.64 % boll damage on 33rd SMW. However, the non Bt cotton hybrid Shresth recorded from 0.2 to 2.14 % boll damage throughout the period of observation. The maximum seed cotton yield of 40.4 q / ha was obtained in MRC 6304 followed by 37.1 in MRC 6301 and 34.6 each RCH 314 and RCH 308. The seed cotton yield in NCEH 6 Bt cotton hybrid was 23.3 q / ha, which was lower than the non Bt cotton hybrid shresth (25.4 q / ha)

DISCUSSION

In the present study it was found that the jassid population was almost negligible (< one per three leaves) both in Bt as well as non Bt cotton hybrids. In five Bt cotton hybrids (JKCH 1947, RCH 317, NCEH 6, Ankur 2534

and MRC 6301) it was less than that of non Bt cotton hybrid. Abro *et al.* (2004), also reported that the maximum population of jassid in Bt cotton hybrid did not reach the ETL. The non significant difference in population of jassid in Bt and non Bt MECH 12 was also reported by Lavekar *et al.*, 2004.

The current study revealed that in general whitefly population was more than that of jassid in Bt cotton hybrids. This was also pointed out by LongWa *et al.* (2005) that the whitefly is a predominant pest in Bt cotton. The whitefly incidence was more in all Bt cotton hybrids than that of the non Bt cotton hybrid in the current investigations. JinJie *et al.* (2000), also recorded 29.7 % more whitefly in the Bt cotton entries compared to that of the non Bt cotton control plants. Higher population of whitefly in Bt cotton as compared to non Bt cotton could be due to reduction in the spray of chemical insecticides or the negligible infestation of bollworms.

The bollworm damage in the current experiments revealed almost nil damage to the bolls in Bt cotton compared to non Bt cotton hybrid. This shows the effectiveness Bt protein expressed in the transgenic plant. The survey carried out by Layton *et al.* (2000) in Mississippi cotton also revealed the lesser boll damage i.e. 1.48 % in Bt cotton than that of non Bt cotton i.e. 3.44 %. The seed cotton yield in 12 out of 13 Bt cotton hybrids were more than that of non Bt cotton hybrid. This reveals the superiority of Bt cotton hybrids in terms of yield. The same opinion of increased in yield in Bt cotton hybrids were also put forth by many earlier workers (Channakeshava and Patil, 2006; Kambhampati *et al.*, 2006).

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