



TMC MM 1.4: Development and promotion of Bt transgenic cotton for bollworm resistance

Introduction:

Development of public sector Bt hybrids/varieties is the immediate requirement for Indian farmer so that it is available at reasonable price. Efforts are also needed to transfer Bt events (approved/new) into long linted diploid arboreum cotton.

Objectives:

1. Development of Bt Cotton through backcross breeding using approved Bt gene event belonging to public Institute
2. Genetic transformation of new Bt genes
3. Identification of stable and

- highly expressive events.
4. Identification of varieties and hybrids suitable for different cotton growing situations
5. Promotion of promising Bt varieties / hybrids.

Salient findings:

Activity 1 : Development of Bt Cotton through back cross breeding using approved Bt gene event belonging to public Sector. Backcrossing programme was carried at Dharwad and Nagpur centre during 2007-08. At Dharwad centre, 55 genotypes are under BCI stage, 30 elite germ plasm are under BC4 stage and 4 varieties are under BC5

stage. At Nagpur centre, 15 genotypes are under BCI stage, 12 genotypes are under BO stage, 5 genotypes are under BO stage and 20 genotypes are under BC4 stage.

Activity 2 : Genetic transformation of new Bt genes:

Genetic transformation is under progress for CryIAc, Cry1Aa3, CryIF and Cry2Aa. Genetic transformation with new Bt genes using Agrobacterium (Table 1) was performed in *G. hirsutum* cultivar Sahana (Cry2Aa) and PA255 (Cry1Aa3, Cry IF) and PA402 (CryIF, Cry IAc) enhancer in diploid cotton (*G. arboreum*).

Table 1: Genetic transformation of new Bt genes

Genotypes	Gene	+ ve plants	Test	GeMiation	Centre
Sahana	Cry2Aa	06	Kan	To	Dharwad
PA-255	Cry1Aa3	05	Kan	To	Nagpur
	CryIF	03	Kan	To	Nagpur
PA-402	Cry1Aa3	11	Kan	To	Nagpur
	CryIF	01	Kan	To	Nagpur
	Cry IAc (enhancer)	02	Kan	To	Nagpur

Activity 3 : Identification of varieties and hybrids suitable for different cotton growing situations.

In North Zone, two trials comprising 32 Bt hybrids in first trial and 15 hybrids were conducted at four locations namely, Hisar, Sirsa, Faridkot and Sriganaganagar. On an average MRC 7017 (BG III) recorded highest seed cotton yield (3820 kg/ha) followed by RCH B4 BG II (3575 kg/ha) and Bioseed 6488 (3369 kg/ha). In second trial, MRC 6029 Bt recorded highest seed cotton yield (3751 kg/ha) followed by RCH 314 Bt (3595 kg/ha) and NCS 138 Bt (3402 kg/ha). All the top yielding hybrids recorded fibre strength around 22 g/tex (2L7-232 g/tex) and the S/l (strength/length) ratio was between 0.72-0.8.

In South zone, Bt hybrid trials (three

sets) were conducted over three locations namely, Dharwad, Guntur and Coimbatore. On an average over 3 locations PRCH 103 Bt recorded highest seed cotton yield of 2230 kg/ha followed by Tulasi-117 Bt (2225 kg/ha) and ACH 155-1 Bt (2183 kg/ha). All the top yielding hybrids recorded more than 20% (22.5% to 26.6%) higher yield than RCH-2 BG II

In second set trial, NCS-207 BG II (Mallika) recorded 15.7% to 17.4% more seed cotton than local checks. Among top yielding hybrids, NCS-207 BG II (2539 kg/ha) recorded highest seed cotton yield followed by NCS-207 BG II (2169 kg/ha) and ACH 6 BG II (2130 kg/ha).

In third set inter specific hybrids were evaluated. Kashinath FBT recorded highest seed cotton yield of 2474 kg/ha followed by Ole Bt (2441 kg/ha).

In Central zone Bt trials were conducted under rainfed and irrigated conditions. On an average over five locations top five high yielding hybrids recorded 342 to 40.4 percent more seed cotton yield than RCH 2 BGI (check). RCH 377 recorded highest seed cotton yield of 2822 kg/ha followed by KCH 14 BG II (2764 kg/ha), RCH138 (2717 kg/ha), KDCHH 1821 (2713 kg/ha) and PRCH 31 (2698 kg/ha). Bt hybrids KCH 14 BG II (23.1 g/tex), RCH 138 BG II (23.0 g/tex) and RCH 2 BG II (22 g/tex) recorded desirable fibre strength with S/l ratio of 0.78, 0.82 and 0.73, respectively. On an average over three locations under rainfed condition, MRC 6301 Bt recorded highest seed cotton yield (2145 kg/ha) followed by MRC 7301 BG II (1991 kg/ha) and MRC 7918 (1986 kg/ha).



Kanamycin resistant T, BCS 23 Plants