

Study No.15:

Title : Effect of *B.t.* cotton on the soil fauna
Organization : Metahelix Life Sciences Private Limited, Bangalore
Status : Kharif 2006 - Completed

Objective: The objective of this study was to assess the effect of the *B.t.* cotton plants expressing the *cryIC* gene developed by Metahelix Life Sciences, on the soil fauna.

Introduction: Soil characteristic is a key element in the growth of plants. The soil formation and usefulness is many a times determined by the soil microbiota. Soil fauna is reported to be involved in several activities like soil mounding, mixing, regulation of soil erosion, movement of water and air in soil, nutrient cycling and production of special constituents through the processes of regurgitation, mixing of saliva or excreta with soil (Hole, 1981). The soil fauna is also known to play a role in the decay of organic matter in the soil and thus making the nutrients available to the plants (Bishop and Blood, 1980)

Methodology: Soil samples were collected by digging out soil from a pit of size 30 cm in diameter and a depth of 90 cm between two cotton plants in a row (Fig.1). Soil samples were collected from rows of both *B.t.* and non *B.t.* cotton plants, from two locations, namely Attur in Tamil Nadu and Guntur in Andhra Pradesh, where the trials were conducted.

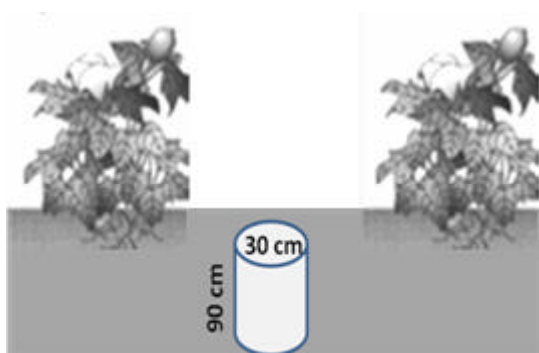


Fig. 1: Diagrammatic representation of soil sampling for the soil fauna studies

The soil samples were spread on papers and the clods were gently broken. Samples were observed for the presence of earthworms and the others organisms present were also recorded.

Results and Conclusions: Effect of the MLS *B.t.* cotton on the soil fauna was evaluated by estimating the faunal density at two locations (Table 1). In general, arthropods were predominant. The faunal diversity was found to be varying between the two locations. However, there was no difference in the faunal density between the soils from *B.t.* and

the non *B.t.* fields either at Attur or at Guntur. The soils of Guntur *B.t.* cotton field had more faunal diversity compared to the soils from Attur. Earthworms were the predominant annelids found at Guntur soils. Trehan (1945) reported that farming practices like ploughing could lead to direct injury to the fauna besides death due to desiccation in the cotton fields. Draught and soil hardness are other aspects that could alter the faunal density. Darlong et al., (2001) reported that the soil fauna biomass is very less in general, in comparison to the soil mass. Abiotic factors like moisture have more influence on surface-active soil fauna found in furrow-irrigated cotton (Lytton-Hitchins, 1998).

Table 1: Faunal Density at Attur and Guntur

No.	Name	<i>B.t.</i> Field	non- <i>B.t.</i> field
Guntur, Andhra Pradesh			
1	Earthworms	17	20
2	Ants	25	32
3	Mites	3	1
4	Spiders	0	1
5	Grubs	1	0
6	Centipedes	3	1
7	Beetles	1	1
8	Termites	4	5
9	Milipedes	1	0
10	Silverfish	1	0
Attur, Tamil Nadu*			
1	Earthworms	1	2
2	Grubs	0	1
3	Centipedes	2	0
4	Beetles	1	0

Broken pieces of shells and insect body parts found in soils from both *B.t.* and non *B.t.* fields also indicate that active fauna were present in the soil. The observations on the faunal density at both locations show no difference between the soils from *B.t.* and non *B.t.* fields. The data indicates that the effect of MLS *B.t.* cotton on the soil fauna is similar to that of non *B.t.* cotton and could thus be concluded as safe for soil fauna.

References:

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3. Trehan, K.N. (1945). Some observations of the soil fauna of cotton fields at Lyallpur. *Proceeding of Indian Academy of Sciences*, 21, 191-201.
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