Impact of dissemination and adoption of insecticide resistance management (IRM) strategies against cotton pests in South 24 Parganas district of West Bengal

LC PATEL and NJ MAITRA*

Divyodaya Krishi Vigyan Kendra, Chebri, Khowai 799207 Tripura
***Ramkrishna Ashram KVK, Nimpith Ashram, South 24 Parganas**
743338 West Bengal
Email for correspondence: lakshman_patel@rediffmail.com

ABSTRACT

The farmers' participatory window based insecticide resistance management (IRM) strategies for cotton pests were implemented in 2004-05 in 5 villages to 15 villages in 2010-11 in 15 villages of South 24 Parganas district of West Bengal. Overall bollworm infestation of cotton was minimized in both IRM and non-IRM villages. The average population of sucking pests was always comparatively less in IRM villages than non-IRM villages. Eco-friendly pesticides were used in IRM villages resulting in more number of natural enemies. The number of sprays was reduced from 2.60 to 1.40 in IRM villages in comparison to 3.91-4.10 in non-IRM villages during the project period of 2004-05 to 2010-11. The project farmers spent less average expenditure (945.85/ha) and realized more average net profit (` 3,284.28/ha) than non-project farmers. Awareness has been developed among IRM farmers on the need and use of eco-safe insecticides and botanicals to create favourable environment for increasing the natural population of beneficial insects in their field. Now IRM farmers have the ability to identify both the harmful as well as beneficial insects in their fields. The strategies of IRM were also adopted in cotton surrounding rabi-summer okra, chilli, tomato, sunflower and green gram.

Keywords: Cotton pests; IRM; non-IRM; beneficial insects; sprays reduction; impact

INTRODUCTION

Cotton is one of the important commercial as well as cash crops of India. With the area expansion and intensive cotton cultivation under proper agronomic management it is realized that the profit margin from the cotton cultivation was not satisfactory. Damage caused by different insect pests apart from seasonal factors was identified as the main reason for the decreasing trend of net return in cotton (Rao and Rao 2006). Now it is cultivated over an area of about 4,851 ha in the aman rice fallows during the Rabi-summer season under rainfed situation in the district South

24 Parganas of West Bengal (Anon 2007-08). Infestation of sucking pests mainly aphids, jassids and thrips and bollworm complex mainly *Helicoverpa armigera, Earias sp* and *Spodoptera litura* were increasing as these dreadful pests used to harbor on the alternate hosts like summer okra, sunflower and green gram before the execution of insecticide resistance management (IRM) in the district. To get rid off from this situation farmers were fully dependent upon the conventional synthetic insecticides for management of these insect pests. Use of several insecticidal sprays at short intervals insecticides mixtures and higher doses were common which in turn increased the cost of cultivation as well as resistance of target insect pests to insecticides. Such resistance has already been reported in several insect pests (Reed and Pawar 1982). The development of resistance in *H armigera* to different groups of insecticides was also recorded by several workers in different cotton growing states of India (Bhatia1986, Armes et al 1994, Arora et al 2003, Kranthi et al 1997, 2001). Dhawan et al (2011) reported the development of resistance of bollworms of cotton to almost major classes of conventional pesticides before the introduction of *Bt* cotton. Keeping this in view to combat the increasing insect pest problems in non *Bt* cotton the present study on IRM was done to ensure sustainability and profitability in non-traditional cotton cultivation in South 24 Parganas district of West Bengal with the objectives i) to optimize the use of insecticides in a manner that maximizes their efficacy, minimizes the intensity of selection pressure and mitigates the adverse effect on ecosystem and environment, ii) to study the level of resistance of cotton pests mainly American bollworm *H armigera* to different groups of conventional insecticides and synthetic pyrethroids, iii) to disseminate the strategy of IRM in the cotton growing villages as farmer participatory programmes, and iv) to introduce and popularize the environmentally benign insecticides and botanicals among the farmers.

MATERIAL AND METHODS

Resistance monitoring of *H armigera*

Mass rearing of *H armigera* on artificial diet as described by Armes et al (1992) was done in the IRM laboratory of Ramkrishna Ashram KVK, Nimpith to monitor the resistance level of some conventional and new insecticides against it. Disinfecting the insect mass rearing room and materials initial insect culture was developed by collecting fully grown up and healthy larvae from untreated field of cotton, sunflower and tomato. The insecticides resistance monitoring studies against *H armigera* were carried out with seven insecticides such as endosulfan, cypermethrin+chlorpyriphos, spinosad, emamectin benzoate, novaluron, flubendiamide and indoxacarb. Third instar larvae were randomly subjected to above mentioned different recommended doses of