



Management Of Mealy Bugs *Phenacoccus Solenopsis* Tinsley On Bt Cotton (*Gossypium* Spp)

Key words : Bt cotton, mealy bugs, Profenophos

Bt cotton contains a genetically introgressed endotoxin gene from the gram negative soil bacteria (*Bacillus thuringiensis* Hubner) represents a significant technological landmark in the global cotton Research. The area under Bt cotton increased from a mere 50,000 ha during 2002 to 7.6 m ha in 2008-09 i.e., 82% of cotton area (ISAAA, 2009). Surveys indicated multiple benefits of Bt technology viz., increased yield, decreased production costs, reduction in pesticide use and plant protection costs (Ahuja 2006; Ramasundaram *et al.*, 2007 and Sakkari, 2010). The other spin-offs have been emergence/resurgence of secondary pests like mealy bugs, mired bugs and disorders like wilt and leaf reddening (Hebbbar *et al.*, 2007).

Recently, the mealy bug *phenacoccus solenopsis* Tinsley (Hemiptera; psendococcidae) has emerged as a serious sucking pest on cotton due to decrease in the number of pesticidal application in cotton agro-ecosystem, and caused serious damage in Pakistan during 2005 (Abbas *et al.*, 2005). Subsequently, mealy bug also reported from Punjab (Dhawan *et al.*, 2007) and Gujarat (Jhala and Bharpoda, 2008).

Both nymphs and adults of mealy bug feeds on the sap of leaves, tender shoots, bracts, bolls resulting in withering of leaves and shoots and affects plant growth adversely (Bhosle *et al.*, 2007). It also excrete large quantities of honeydew on to the plant that in turn attracts ants and sooty mould which affects photosynthesis. In cotton, the attacked parts result in bunchy top and stunted growth. Plant produces fewer bolls with smaller size and fail to open properly which ultimately adversely affects the seed cotton yield (Dhawan *et al.*, 2007).

In Andhra Pradesh, roving surveys (2007-2008) indicated 2 different types of mealy bugs (*Phenacoccus solenopsis* Tinsley and

Maconellicoccus hirsutus Green) in cotton ecosystem, of which *P. solenopsis* Tinsley is the most prevalent in its occurrence in Telangana region. The farmers are suffering huge losses in yield and quality because of this pest, warranting to evaluate suitable management practices for this nasty sucking pest.

Indiscriminate use of insecticides lead to insect resistance, environmental pollution and increased cost of cultivation. In this context present study was conducted for evaluating biological agents, botanicals and certain few new chemicals for rapid and effective control of mealy bugs on Bt cotton.

For mealy bug management, the cotton Bt hybrid Mallika BG-I was sown during June 2008. There were 10 treatments excluding control. The details of treatments are given in table 1. The experiment was designed in Randomized block with 3 replications. The population of mealy bugs was recorded from five tagged plants. The population was recorded from 2.5 cm part of the central shoot of the plant. The crop was sprayed during September, October and November when population was observed on central shoot. Population of mealy bugs was recorded on 3rd day after spray. The yield was also recorded from tagged plants to estimate the seed cotton yield. The data obtained were subjected to statistical analysis as per standard procedures.

Data pertaining to efficacy of different insecticides, biological agents and botanicals were against mealy bugs was presented in Table 1.

Results indicated that profenophos 50 EC, along with gum significantly recorded highest percent reduction of mealy bugs (95.6) 3 days after 1st spray and the least in water spray (0.9). None of the chemicals (Acephate, Chloropyriphos and Dichlorovos), biological agents (*Verticillium lecanii* and mealy quit), or others (fish oil rosin liquid,

Table. Efficacy of different insecticides, botanicals, biological agents and others against mealy bugs on Bt cotton and influence on seed cotton yield

Treatment	Dose (g/ml/ lit)	Per cent reduction in mealy bugs *			Seed cotton yield (kg/ha)
		1 st spray	2 nd spray	3 rd spray	
Acephate 70 SP	1.5	49.0 (44.4)**	52.5 (46.5)	55.4 (48.1)	2472
Chlorpyriphos 20 EC	3	8.6 (17.0)	10.4 (18.8)	13.1 (21.2)	1235
Profenophos 50 EC + gum	30.5	95.6 (78.2)	95.4 (78.1)	94.1 (76.1)	3555
Dichlorovas 76 EC + gum	10.5	62.9 (52.5)	46.0 (41.1)	65.2 (53.9)	3141
Neem seed kernel extract 5%	50	22.5 (28.3)	27.5 (31.6)	28.5 (32.3)	1758
Neem oil (1000 ppm) + detergent powder	50.5	24.0 (29.3)	29.1 (32.6)	33.2 (35.2)	1774
Detergent powder	0.5	2.7 (9.5)	4.7 (12.5)	7.8 (16.2)	830
Fish oil rosin liquid	2	5.7 (13.8)	11.7 (20.0)	10.5 (18.9)	1266
Mealy quit	10	5.7 (13.8)	7.5 (15.8)	11.5 (19.4)	1316
<i>Verticillium lecanii</i>	5	3.8 (11.2)	8.2 (16.5)	19.8 (26.4)	1541
Water spray (control)	-	0.9 (5.5)	1.2 (6.2)	1.3 (6.6)	734
SEM±	-	1.2	4.2	1.3	65
CD (P=0.05)	-	3.7	12.3	3.8	191

* Per cent reduction was recorded 3rd day after spraying

* Figures in parentheses are Arc sine transformed values

detergent powder) were as effective as Profenophos + gum in which the percent reduction was 62.9, following mealy bug are Dichlorovos 76 EC + gum in which the percent reduction was 62.9, followed by Acephate 70 SP (49.0), these two chemical treatments significantly recorded higher mealy bug control over others. Use of NSKE or neem oil + detergent powder reduced mealy bugs to 22.5 and 24.0 per cent respectively and these two treatments were significantly superior in percent reduction of mealy bugs over spraying of chloripyriphos (8.6), Fish oil rosin liquid (5.7), Mealy quit (5.7), *Verticillium lecanii* (3.8) and detergent powder (2.7).

The data on third day after second spraying in the month of October and third spraying in the month of November also showed similar trend as first spraying.

Over all, the insecticide Profenophos 50 EC @ 3g + gum 0.5 g/lit was found most effective

in managing mealy bug, followed by dichlorovos 76 EC @ 1 ml + gum 0.5 g/lit of water and Acephate 70 SP @ 1.5 g/lit of water. Saeed *et al* (2007) from Pakistan tested different insecticides under field condition and reported that methomyl, Profenophos and chloripyriphos were found best in the management of mealy bugs on cotton partially supporting the findings of present study. Dhawan *et al* (2009) concluded that profenophos has high initial check over mealy bug crawles/nymph and adult in comparison with chloripyriphos and acephate. The present research results corroborated well with these findings.

The yield of seed cotton was significantly highest in Profenophos 50 EC (3555 kg/ha) except Dichlorovos 76 EC (3141 kg/ha) which were at par with each other. Lowest seed cotton yields were recorded with water (734 kg/ha) and detergent (830 kg/ha) spraying. Unabated incidence of mealy bugs reduced seed cotton yields to an extent of

2821 kg/ha compared to best treatment (Profenophos spraying). Bhosle *et al* (2007) also recorded higher seed cotton yields by controlling mealy bug with application of profenophos in cotton.

Incidence of mealy bugs was severe in certain pockets of Telangana region of Andhra Pradesh and it may prove as a major biotic constraint in ensuing years is left uncontrolled. Profenophos has high check over *P.solenopsis* crawlers/nymph and adult population in comparison with other chemicals.

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