Evaluation of various Synthetic Insecticides against Thrips (*Thrips tabaci*) in Bt Cotton

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Abstract— *Cotton (Gossypium spp.) popularly known as 'white gold' is one of the most ancient important cash crop of India. Apart from its value as fibre, it has great potential to be used as edible oil, food for animals and other by products like particle board and boxes. The development of Bt cotton containing a genetically introgresses endotoxin gene from the gram negative soil bacteria (Bacillus thuringiensis Hubner) represents a significant technological land mark in the global cotton research. Thrips is a major sucking pest on cotton crop, causing quantitative and qualitative losses to cotton. An experiment was conducted at Agriculture Research Station, Sri Ganganagar in Randomized Block Design with 10 treatments including control and replicated three times, to evaluate various insecticides against thrips in Bt cotton. The study revealed that maximum reduction (56.00%) in thrips population was recorded with the treatment of Acephate 75% SP, followed by Imidacloprid 17.8% SL (49.66%). Both the treatments were at par and significantly superior over the other treatments. The phytotoxic effect on crop could not be observed during the experimental period.*

Keywords— Cotton, Agriculture Research, Acephate, soil bacteria, Acephate.

I. INTRODUCTION

Cotton is one of the prominent industrial and economic crops of india. The pest spectrum of cotton crop is quite complex and these pests not only reduce the yield but also adversely affect the quality of lint and seed. The development of Bt cotton containing a genetically introgresses endotoxin gene from the gram negative soil bacteria (*Bacillus thuringiensis* Hubner) represents a significant technological land mark in the global cotton research. India adopted this technology in 2002-03. Last few decades bollworm attack on cotton was a serious problem but, with the introduction of Bt varieties of cotton this problem has been solved to some extent and a significant change in cropping scheme in the cotton growing areas has been observed (Ahsan & Altaf, 2009). But the problem of sucking insect pests attack is remained unsolved still now. Among them thrips is most destructive sucking pest. Thrips attack cotton crop early in the season, but high population densities can be seen during second fortnight in September (Gupta *et al*., 1997, Khan *et al*., 2008). Both nymph and adult stages of thrips damage the tissue and destroy leaves by sucking cell sap. Due to the attack of this pest, leaves curl up and in the case of several attack, plant remains stunted at initial stage.This insect is widely distributed in northern area. The chemical control is the one of the rapid methods to reduce the losses caused by sucking insect pests to the cotton crop (Gogi *et al*., 2006). Many new chemical insecticides are introduced in the market for management thrips therefore, the present study was undertaken to evaluate the various insecticides for management of thrips (*Thrips tabaci*) in Bt cotton.

II. MATERIALS AND METHODS

The experiment was conducted in Randomized Block design with 10 treatments including Control and three replication at the Agriculture Research Station, Sri Ganganagar (Raj.). The crop was raised in 10 m x 5 m plotes with 100 cm row to row and 60 cm plant to plant distance. Total four sprays of each insecticide viz., Acephate 75% SP, Thiomethoxam 25% WG, Acetamiprid 20% SP, Diafenthiuron 50% SP, Calypso 24% OD, Sulfoxaflor 24% SC, Triazophos 40% EC, Imidacloprid 17.8% SL and Pyriproxyfen 10% EC were given at 10-15 days interval depending upon climatic condition. The efficacy of various insecticides will be assessed by counting the living population of thrips on 5 randomly selected plants in each plot 24 hours before and after 1, 3, 5 and 10 days of treatment. The observations on the surviving insects after each treatment at definate time intervals were recorded and percent reduction in population was calculated. Percent reduction was calculated by using the below mentioned formula:

$$\text{Percent Reduction } \frac{(Pop.\,before\,spray)-(Pop.After\ Spray)}{Pop.\,before\,Spray}\times 100$$

The data recorded were presented as mean values, which were subjected to Analysis of Variance (ANOVA) and Critical Difference (CD) was worked out to compare different treatments. For Analysis of Variance, the data on percentage reduction were transformed into angular values. The critical difference calculated was compared between mean percent reductions at definite time interval.

III. RESULTS AND DISCUSSION

The evaluation of various insecticides against thrip population depicted in the Table-1 clearly indicates that thrip population was significantly low in all the plots treated with insecticides over control. The study revealed that maximum reduction (56.00%) in thrips population was recorded with the treatment of Acephate 75% SP, followed by Imidacloprid 17.8% SL (49.66%). Both the treatments were at par and significantly superior over the other treatments. The phytotoxic effect on crop could not be observed during the experimental period. . In our experiment, nine chemicals were tested against thrips under field conditions, among these chemicals some were found effective against thrips while others were found to be less effective. Our results suggested that, Acephate 75% SP and Imidacloprid 17.8% SL were proved to be the most effective insecticide resulted in significant reduction of thrip populations as compared to all other insecticides . The results agree with of the findings of Iqbal *et al*., (2013) who reported maximum control of thrips population with the treatment of Acephate. Similar trend was observed by Pachundkar *et al*., (2013) and Patil *et al*., (2014) who concluded that Acephate was found to be highly effective against thrips population. The present results also get support from the observations of Kolhe *et al*., (2009) who found that Imidacloprid was most effective against thrips. The treatment module in the applied does not show any phytotoxic effect on cotton plants.

TABLE 1
BIO-EFFICACY OF VARIOUS INSECTICIDES ON PERCENT REDUCTION OF THRIPS IN BT COTTON

Treatment	Doses (a. i./ha)	Pooled mean of four sprays				
		Mean % Reduction of thrips / 3 leaves				Pooled
		1 DAS	3 DAS	5 DAS	10 DAS	
Acephate 75% SP	800 g	62.22# (51.09)*	58.51# (45.38)*	52.51# (46.42)*	50.75# (45.41)*	56.00# (47.08)*
Thiamethoxam 25% WG	200 g	42.40 (40.94)	35.46 (40.94)	34.78 (36.03)	28.25 (31.90)	35.22 (37.45)
Acetamiprid 20% SP	160 g	49.02 (43.20)	42.69 (40.62)	38.15 (38.09)	29.02 (32.54)	39.72 (38.61)
Diafenthiuron 50% SP	800 g	35.58 (38.85)	33.66 (33.00)	28.81 (32.32)	14.96 (22.56)	28.25 (31.68)
Calypso 24% OD	400 g	23.44 (28.15)	21.85 (26.17)	20.61 (26.82)	19.89 (26.37)	21.44 (26.88)
Sulfoxaflor 24% SC	400 g	34.47 (33.79)	30.44 (32.71)	26.12 (30.63)	23.13 (28.63)	28.54 (31.44)
Triazophos 40 % EC	1000 ml	40.40 (43.29)	32.87 (38.46)	30.87 (33.68)	24.72 (29.18)	32.22 (36.15)
Imidacloprid 17.8% SL	133 ml	59.26 (51.01)	55.83 (46.42)	46.38 (42.88)	37.19 (37.51)	49.66 (44.46)
Pyriproxyfen 10 % EC	400 ml	27.79 (32.44)	24.73 (30.75)	21.46 (27.44)	18.67 (25.36)	23.16 (29.00)
Control		1.98 (7.86)	2.39 (8.14)	2.63 (9.19)	2.41 (8.80)	2.35 (8.50)
SEM		1.88	1.65	1.75	1.50	1.47
CD		5.58	4.89	5.19	4.45	4.37
CV%		7.69	7.76	8.78	8.03	8.91

 # Pooled mean of four spyays
****Values in parenthesis are transformed angular values***
DAS Days after spray

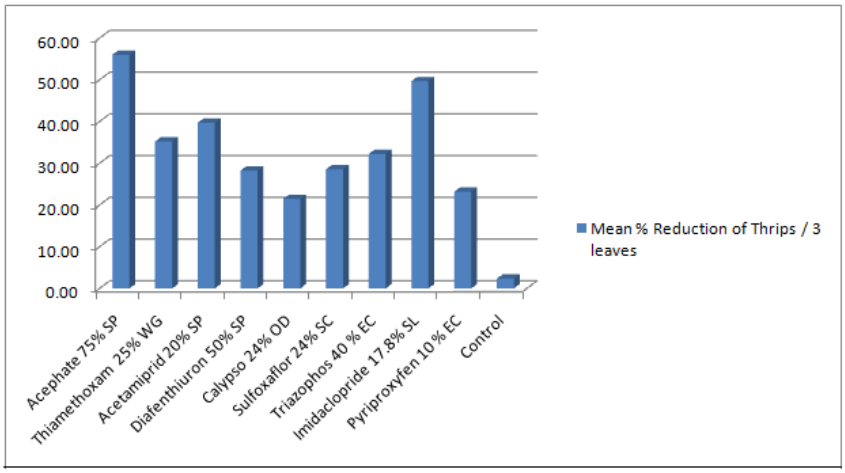

FIGURE 1: MEAN % REDUCTION OF THRIPS / 3 LEAVES

IV. CONCLUSION

Thrip population was significantly low in all the plots treated with insecticides over control. Our results suggested that, Acephate 75% SP and Imidacloprid 17.8% SL were proved to be the most effective insecticide resulted in significant reduction of thrip populations as compared to all other insecticides . Both the treatments were at par and significantly superior over the other treatments. The phytotoxic effect on crop could not be observed during the experimental period.

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