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EVALUATION OF INSECTICIDES AGAINST COTTON WHITEFLY, *BEMISIA TABACI* (GENN.) (HOMOPTERA: ALEYRODIDAE)

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Abstract: The experiment was conducted to evaluate the efficacy of Imidacloprid (Confidor 200SL), Acetamaprid (Mospilon 20SP), Methamidophos (Tamaron 600SL), Endosulfan (Thioluxon 35EC), Buprofezin (Sitara 25WP), Fenpropathrin (Fenthrin 20EC) and Diafenthiuron (Polo 500 SC) against whitefly, *Bemisia tabaci* (Genn.) on cotton variety CIM-473 during the crop year 2002. The crop was sprayed twice in September. After seven days of the first spray, the lowest population (0.6/leaf) of whitefly was observed in plots treated with Endosulfan 35EC followed by Acetamaprid 20SP(1.1/leaf), while the plots receiving Buprofezin 25 WP + Fenpropathrin 20 EC, Methamidophos 600SL and Imidacloprid 200SL had population of whitefly statistically similar. Seven days after second spray Acetamaprid 20SP and Diafenthiuron 500SC treated plots had the lowest population (1.4 per leaf) of whitefly followed by Imidacloprid 200SL (1.8 per leaf) and Fenpropathrin 20EC (1.9 per leaf).

Keywords: *Bemisia tabaci,* cotton, evaluation, insecticides.

INTRODUCTION

Cotton is rightly called backbone of economy of Asian countries [Ahmad 1999]. Cotton whitefly, *Bemisia tabaci* (Genn.) has very old history of infestation on cotton even before the introduction of modern insecticides [Hussain and Trehan 1933]. It is a polyphagous insect pest of many agricultural crops and cosmopolitan in distribution. In addition to direct damage to cotton crop it inhibits photosynthetic activity and impairs fiber quality of the cotton. It is also well known vector of various viral diseases on many economic crops [Henneberry *et al*. 1999, Ahmad 1999].

Insecticides are the only tools to control the insect pests in Pakistan since the introduction of the long staple American cotton. Different workers in the past have evaluated various insecticides for their comparative toxicity for this pest under different climatic conditions. Lublinkof and Odom [1994] and Perez *et al*. [1994] compared Buprofezin and conventional insecticides, whereas Ahmad and Khan [1991] compared different insecticides against whitefly. Insecticides with new chemistries have been studied by Horwitz *et al*. [1998], Parish [2001], and Natwick and Deeter [2001] against the insect pest in question. Present studies were, therefore, planned to evaluate the efficacy of currently used insecticides to control this pest on cotton during 2002 crop year.

MATERIALS AND METHODS

Cotton variety CIM-473 was sown on beds on June 03, 2002 in an area of about one acre field at experimental farm of the University College of

Agriculture, Bahauddin Zakariya University, Multan. Total area selected for experiment was 2030 m^2. The trial was laid out in randomized complete block design (RCBD) having four replications and six treatments including control. There were, thus 24 plots each measuring 10 m x 7 m. Each plot had four beds (eight lines) of cotton plants. The experimental area was 1680 m^2 and non-experimental area was 350 m^2. Recommended doses of fertilizers and irrigation were applied. The population of whitefly was recorded at 6-7 leaf-stage of plants. For this purpose six plants were selected randomly from each plot. Population was recorded from upper leaf of first plant, middle leaf of second plant, lower leaf of third plant and so on [Afzal *et al*. 2000]. When the population of whitefly reached above ETL, i.e. 4-5 adults or nymphs per leaf [Ahmad 2000] in the beginning of September, the crop was sprayed on September 03, 2002 and again on September 26, 2002 when population reached ETL. The insecticides sprayed are listed in Tables 1 and 2. For spraying, insecticides were dissolved in tape water to prepare the insecticide solution on Vol./Vol. or wt./Vol. basis. The crop was sprayed with hand operated knapsack sprayer in the morning.

Table 1: Average population of whitefly, *Bemisia tabaci* (Genn.) per leaf of cotton variety CIM-473 at different time intervals after application of 1st spray.

Treatments	(Dose per Acre)	No. of Whitefly (hours after treatment)*			
		24	48	72	168
Imidacloprid 200SL	250 gm	1.2b	1.3c	1.5c	1.7b
Acetamaprid 20SP	150 gm	0.3c	0.4d	0.9d	1.1c
Methamidophos 600SL	500 ml.	1.5b	1.8b	1.8b	2.0b
Endosulfan 35 EC	800 ml	0.3c	0.4d	0.5e	0.6d
Buprofezin 25WP + Fenpropathrin 20 EC	450 gm + 330 ml	1.2b	1.4c	1.6bc	2.0b
Control	-	5.0a	5.1a	5.3a	5.5a

Table 2: Average population of whitefly, *Bemisia tabaci* (Genn.) per leaf of cotton variety CIM-473 at different time intervals after application of 2nd spray.

Treatments	(Dose per Acre)	No. of Whitefly (hours after treatment)*			
		24	48	72	168
Imidacloprid 200SL	250 sgm	0.9bc	1.1bc	1.2c	1.8b
Acetamaprid 20 SP	150 gm	0.40e	0.6d	0.8d	1.4c
Diafenthiuron 500SL	250 ml.	0.60de	0.8cd	1.0cd	1.4c
Buprofezin 25WP	450 gm	0.75cd	0.8cd	1.1cd	1. 6bc
Fenpropathrin20 EC	330 ml	1.20b	1.3b	1.6b	1.9b
Control	-	5.30a	5.2a	5.2a	5.4a

* Means with common letters (in columns) are not significantly different at 5% level of significance (LSD, $P < 0.05$).

The population of whitefly was recorded after 24, 48, 72 and 168 hours of 1st and 2nd spray. The data were analyzed by the analysis of variance (ANOVA). The significance of differences in the mean population of the insect pest was sorted out with the help of least significance difference (LSD) at 5% level of significance [Steel and Torrie 1960]. The toxicity of various insecticides was considered to be an indirect reflection of pest population [Razaq 1996].

RESULTS AND DISCUSSIONS

The population of whitefly was significantly different among various treatments after 24, 48, 72 and 168 hours of 1st spray (Table 1). All the insecticides reduced the population below ETL. Endosulfan 35EC and Acetamiprid caused the highest mortality after 24 and 48 hours. The mortality was highest in the plots treated with Endosulfan after 72 and 168 hours of spray followed by Acetamiprid. The population of whitefly in plots treated with Methamidophos, Imidacloprid, the mixture of Buprofezin and Fenpropathrin, was highest and statistically at par after 168 hours of the 1st spray. However, different results were observed for these insecticides after 24, 48 and 72 hours of application. All the insecticides kept the population of the pest below ETL after seven days of the application.

After 22 days of 1st spray, the population of whitefly was again above ETL; therefore the crop was sprayed again. The population was significantly different among various treatments after 24, 48, 72 and 168 hours of the 2nd spray (Table 2). Acetamiprid and Diafenthiuron resulted in the highest mortality of whitefly up till 7th day after 2nd spray, followed by Fenpropathrin and Imidacloprid, whereas, the Buprofezin presented a different trend.

The results are in agreement with those of Horwitz *et al*. [1998], Natwick and Deeter [2001], and Parish [2001], who achieved significant control with application of Acetamiprid. The results are also in conformity with Lublinkhof and Odom [1994] and Perez *et al.* [1994] who concluded that Buprofezin was effective against whitefly. The findings of the present research investigations disagree with those of Ahmad and Khan [1991] regarding the toxicity of traditional insecticides (Endosulfan, Fenthrin and Methomidophos) as they found these to be ineffective against the same pest.

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