

EVALUATION OF DIFFERENT INSECTICIDES FOR THE CONTROL OF WHITEFLY ON COTTON CROP IN KAROR DISTRICT LAYYAH.

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ABSTRACT

The experiment was performed at Adaptive Research farm Layyah to evaluate the efficacy of IGR, Neonicotinoid and other insecticides against the Whitefly. Following insecticides were used against the whitefly i.e., acetamiprid, diafenthiuron, imidacloprid, endosulfan, buprofezin and fenpropathrin. Buprofezin was proved to be effective against nymphs and acetamiprid, diafenthiuron and imidacloprid were effective against the whitefly adults during the year 2003 and 2004.

INTRODUCTION

Cotton (*Gossypium hirsutum* L) is an important cash crop of Pakistan. It was grown over an area of about 2989 thousands hectares with an annual production of 10048 thousands bales. It accounts 8.2% of the value added in agriculture and about 2% to GDP (Anonymous, 2004)

Among various sucking insect pests, whitefly (*Bemisia tabaci* Genn) is the most serious pest and has recently attained the status of a regular cotton pest in Pakistan. It sucks cell sap from the lower side of the leaves and secretes honeydews on which sooty mold develops, which interferes with plant photosynthesis, ultimately reducing the yield. Whitefly adults transmit viral diseases (Buttler and Henneberry, 1994). It plays havoc with cotton crop, in severe cases, the situation becomes particularly grave when such pest serves as a vector of the viral disease (leaf curl virus of cotton) which may ultimately lead to a total collapse of the cotton industry.

Among different control measures, the chemical control of insect pest is quick and rapid one. It is imperative to search out some alternatives of highly toxic insecticides. Some soft insecticides such as insect growth regulators and other new chemistry insecticides are getting more attention of scientists as good substitute. IGRs (buprofezin and pyriproxyfen) were used as key factor in the resistant management, integrated management of whitefly in USA (Ellsworth and Martinez-Carrillo, 2001), and reducing the number of insecticides treatments applied for whitefly control in the coming years in Arizona, USA (Simmons *et al.*, 1997). Buprofezin prevents the adult emergence from the pseudopupa of *Bemisia tabaci* (Valle *et al.*, 2002). The neonicotinoid insecticides (imidacloprid) interfere with the nicotinic acetylcholine receptor of the insect nervous system (Yamamoto, 1996). In the present investigation efforts were, therefore, made to study the effect of these insecticides against whitefly.

The town of Layyah is located South West of Lahore with geographical location of 31-33° latitude North and 70-20° longitude. Average day time temperature during cotton growing season (June to November) is 35°C while night time temperature is 25°C. Relative humidity during this period ranged from 70-80%.

MATERIALS AND METHODS

The study was conducted at Adaptive Research Farm Karor (Layyah) during the Kharif 2003 and 2004. The crop was sown under RCB with 7 treatments including control and three repeats. Data for whitefly was recorded 24 hours before and 48 hours after the insecticides application by randomly selecting the 25 plants in each plot. From each plant one leaf was selected, at different height i.e., upper, middle and lower leaves. The spray was done in the month of August when population reached the ETL. Population data of whitefly nymphs and adults from 25 plants was analyzed by Two way ANOVA and means were compared by DMR test at 5% significance level.

Following seven treatments were applied at the recommended doses of insecticides.

Sr.#	Treatments	Trade Name	Formulation	Dose
1	Control			
2	acetamiprid	Mospilan	20 SP	625 g/ha.
3	diafenthiuron	Polo	500 EC	625 ml/ha
4	imidacloprid	Confidor	300 SL	625 ml/ha
5	endosulfan	Thiodan	35 EC	1.50 liter/ha
6	buprofezin	Buprofezin	25 WP	1.50 Kg/ha
7	fenpropathrin	Danital	10EC	1.50 liter/ha

The population of the whitefly before and after the application of insecticides was correlated with the temperature.

The spray was done with the help of Matabi hand operated sprayer fitted with control flow valve (CFV). The sprayer was fitted with an imported hollow cone nozzle with a discharge rate of 0.80 L/min at 2.4 bar pressure. The crop was sprayed with an application rate of 200 L/hectare. This rate of application was selected keeping in view LAI of the crop. Spray was done during day time with temperature averaging 30-35°C at 5.7 km/hr North West wind. The ambient conditions were selected to minimize the risk of spray drift and evaporation. Agricultural engineeris from Agricultural Machnization Institute were involved to ensure efficacy of spray machine for spraying of pesticides.

RESULTS AND DISCUSSION

During the year 2003 as given in the Table 1, Nymphs population with buprofezin was significantly different with all other treatments with the mean value of 2.66. It was followed by the fenpropathrin, endosulfan, imidacloprid, acetamiprid and diafenthiuron. Buprpfezin is an IGR, which prevents the emergence of adult from the nymph (Ellsworth and Martinez-Carrillo, 2001). But the adult of whitefly population with the treatment of acetamiprid, diafenthiuron, imidacloprid and endosulfan was significantly different from all other treatments with mean value of 56, 58.34, 61.67 and 64. It was followed by fenpropathrin and buprofezin as shown in the graph-1.

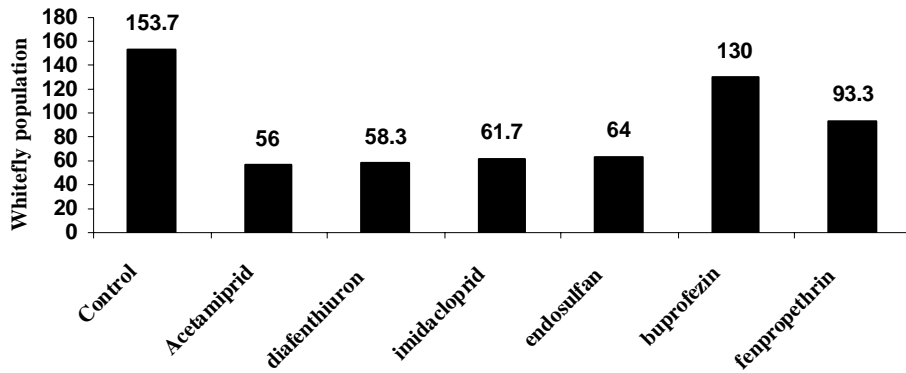
During the year 2004 as given in the Table 2, buprofezin gave the good control of nymphal population of whitefly with the mean value of 2.67 and it was significantly different from all other treatments. Results of the buprofezin are similar to the Lublinkhof and Odom (1994), Perez et al. (1994) and Wolfenbarger and Riley (1994). On second, the most effective insecticide was imidacloprid with the mean value of 6 and it was followed by the endosulfan, diafenthiuron, fenpropathrin and acetamiprid as shown in the Graph-2. Acetamiprid, diafenthiuron, imidacloprid and endosulfan were effective as they were in the year 2003. As the buprofezin is an IGR so, it controls the population of the numphs but it does not control the adult very much in both years. Above explained results of acetamiprid are in conformity with that of Aslam *et al.* (2003), Horowitz *et al.* (1998), Natwick (1999) and Natwick and Deeter (2001). The results of fenpropathrin are agreed with that of Akbar and Hasan (1999) and Ahmad and Khan (1995).

In 2003, population before and after spray was positively correlated with tempetature i.e., 0.129 and 0.903, but in 2004, only post spray population was positively correlated with value of 0.922. It can be assumed that temperature might have affected the population. Reduction in 2004, as evident from additional 8% reduction in adult population over the population in 2003.

Table# 1: Population of whitefly nymph and adults at different treatments during the Year-2003.

Treatments	Nymphs population/25 plants		Adults population/25 plants	
	Before 24 hours of spray (NS)	After 2 days of spray	Before 24 hours of spray (NS)	After 2 days of spray
Control	12.6667	14.00a	145.00	153.67 a
Acetamiprid	10.6667	10.00 b	144.00	56 d
Diafenthiuron	9.6667	10.66 b	166.00	58.34 d
Imidacloprid	12.6667	9.333 b	170.33	61.67 d
Endosulfan	8.6667	8.000 b	160.00	64 d
Buprofezin	9.6667	2.667 c	126.00	130 b
Fenpropathrin	11.0000	8.333 b	125.00	93.34 c

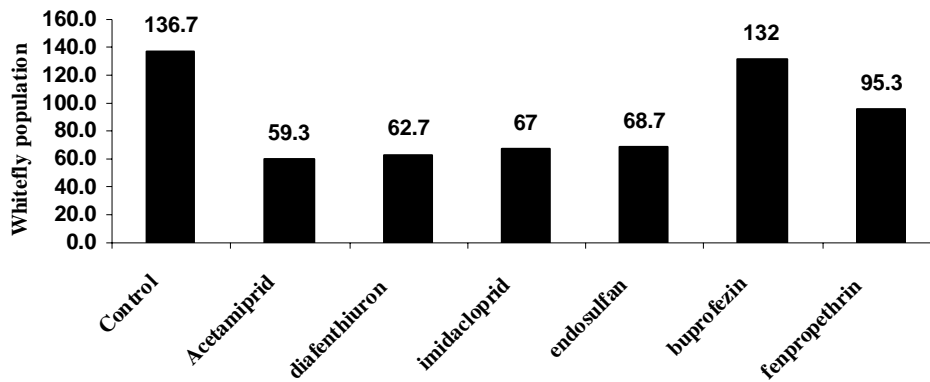
Graph#1: Whitefly Adult population/25 plants after different treatments of insecticides during the year 2003.



Table#2: Population of whitefly nymph and adults at different treatments during the Year-2004

Treatments	Nymphs population/25 plants		Adults population/25 plants	
	Before 24 hours of spray(NS)	After 2 days of spray	Before 24 hours of spray (NS)	After 2 days of spray
Control	8.34	10 a	126.67	136.6 a
acetamiprid	9	8.34 ab	130.67	59.33 c
diafenthiuron	9	8 ab	132	62.67 c
imidacloprid	8.67	6 bc	130.33	67.00 c
Endosulfan	9	7.6 ab	134.67	68.67 c
Buprofezin	8.34	2.67 c	130	132.00 a
fenprothrin	9.34	8 ab	128	95.33 b

Graph#2: Whitefly Adult population/25 plants after different treatments of insecticides during the year 2004.



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