

Comperative Efficacy of Different Insecticides Against Whitefly *Bemisia tabaci* (Genn) on Cotton Varieties

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Abstract: The efficacy of five different insecticides i.e Confidor, Temik, Nuvacron, Asomido and Thiodan was compared against the whitefly on two cotton varieties, CIM-240 and CIM-448. Higher population densities of whiteflies observed on CIM-240. The effectiveness of insecticides vary with each other, however the most effective for both varieties is Thiodan and Asomido. Confidor and Temik were not significantly effected against whitefly. While in case of Nuvacron, there is a fluctuation in two varieties.

Key words: Whitefly, cotton, insecticides, efficacy

Introduction

Cotton is the most important cash crop of Pakistan and the main source of foreign exchange earning. In Pakistan, whitefly i.e *Bemisia tabaci* (Gennadius) is most serious pest of cotton field. It effects the quality of lint by causing debilitation of plants due to feed on cotton leaves (Youdeowei and Service, 1986). The two notorious gemniruses that are cotton leaf curl virus and cotton leaf crumple virus are transmitted by whitefly, and causes heavy losses to many food and fiber crops in Pakistan (Mansoor *et al.*, 1999 and 2000). The mortality results indicate that Nuvacron was highly toxic against whitefly after twelve hours of spray (Ahmad *et al.*, 1994). The insecticides, Azodin 40EC, Sumicidin 20EC and Ripcord 10EC were effective against whitefly after 24h of spray, however toxicity reduced with time interval (Hussain *et al.*, 1992). The pest mortality and seed cotton yield revealed that Triazophos was most effective against sucking pest (Hussain *et al.*, 1993). The most effective dose of Dimecron 100Sc was 400ml(la.i)/acre (Tufail *et al.*, 1995). Afzal *et al.*, 1995 found that Tamaron 600SL @ 360 ml (a. l) acre was effective to control whitefly. Monocrotophos 0.06% was most effective against sucking pests, like aphids, jassids, thrips, whitefly pupae and adults, however, the fenvalerate 0.0125% was most effective against whitefly eggs (Banbote *et al.*, 1995). Promet and Confidor which are seed protectant insecticides were effective to control early season attack of whitefly, jassids and thrips up to four weeks (Atique and Ghaffar, 1996).

Materials and Methods

The field work was carried out at Allahabad near Chishtian in District Bhawalnagar. The area of the field was one acre. Two varieties of cotton i.e. CIM-240 and CIM-448 were sown in 1996 and 1997 respectively. Randomized Complete Block Design (RCBD) has employed with four replications R1, R2, R3, R4 and control plot. Population densities of whitefly were determined randomly upper, middle and lower leaves. When the population of whitefly reached threshold level, the samples were taken from the selected randomly 20 leaves on different cotton plants. The counted number of whiteflies was recorded on pest scouting card. The cotton leaves were selected randomly upper leaf of the first plant, middle of second and lower of third continued this sequence up to twenty haphazardly selected plants. Five pesticides were selected i.e Confidor used for seed dressing, Temik as granules, Asomido, Thiodan and Nuvacron were sprayable. The population of

whiteflies was at its threshold level, sprayed the pesticides to determine the mortality rate. First data were taken after 24h. Second data was taken after 48 hours, third after 72h and fourth after 96 h with respect to time. Each pesticides compared with one another and found which one is the most effective against whiteflies. The block and treatment effects were analysed, Descriptive statistics and ANOVA models were calculated using the SPSS package (Crawley, 1993).

Results

Whiteflies were frequently found on two varieties of cotton i.e CIM-240 and CIM-448 which were sown in two consecutive years in 1996 and 1997 respectively. The mean populations of whitefly before and after spray shown in Fig. 1 and Fig. 2 for both varieties. The highest populations were found in variety CIM-240 as compared to CIM-448. Significant differences were observed only for Confidor and Temik for both varieties indicates that these pesticides show no toxicity (Table 1 & 2). While in case of Asomido and Thiodan, the non significant differences were found in the population of whiteflies, which confirms their toxicity against whitefly. However, the Thiodan found to be most toxic against whitefly then Asomido. In case of Nuvacron, there was a fluctuation in populations between two varieties. The variety CIM-240 Nuvacron showed significant population while for the variety CIM-448 have non significant results.

Discussion

All the insecticides play important role in the mortality of whiteflies. The efficacy of each insecticides has their own way to influence on whiteflies population. The time of duration by which they applied also contributes in its efficacy. Confidor (seed treatment) and Temik (granules) control the density of whiteflies in initial stage on both varieties. There were low population recorded as compared to the other treatments. The fluctuation in the population between the varieties of the Nuvacron is due to the time period. Nuvacron is more toxic against the whitefly in short period after the spray. The total populations of the whitefly recorded after 98 hours. The mortality results indicated that the Nuvacron was highly toxic against whitefly after 12 hours of spray (Ahmad *et al.*, 1994). Higher populations observed on CIM-240 as compared to CIM-448. There are two possibility influence on the population of whitefly. Firstly, may be due to the susceptibility of the variety of CIM-240. Secondly the different environmental factor may be influenced on the population of whiteflies.

Latif *et al.*: Efficacy of different insecticides against whitefly

Table 1: ANOVA comparing the mean numbers of whiteflies classified by before and after spray on CIM-240 (1996). Number for each marked plant are nested within for replicate block

Treatments	Source of variation	sum of squares	df	Mean square	F	significance
Confidor	Between groups	20.842	1	20.930	28.930	0.000
	within groups	24.494	34	0.720		
	Total	45.336	35			
Temik	Between groups	20.938	1	20.938	22.575	0.000
	Within groups	30.607	33	0.927		
	Total	51.546	34			
Nuvacron	Between groups	44.750	1	44.750	8.622	0.006
	Within groups	176.459	34	5.190		
	Total	221.21	35			
Asomido	Between groups	8.256	1	8.256	1.789	0.190
	Within groups	156.871	34	4.614		
	Total	165.128	35			
Thiodan	Between groups	20664.000	1	1	20.664	0.451
	Within groups	155.806	34	4.583		
	Total	158.470	35			
Control	Between groups	208.766	1	208.766	470.416	0.00
	Within groups	149.697	34	4.403		
	Total	358.463	35			

Table 2: ANOVA comparing the mean numbers of whiteflies classified by before and after spray on CIM-448(1997). Number for each marked plant are nested within four replicate block

Treatments	Source of variation	Sum of squares	df	Mean square	F	Significance
Confidor	Between groups	32.9390	1	32.939	76.918	0.000
	Within groups	14.560	34	0.428		
	Total	45.396	35			
Temik	Between groups	21.356	1	21.356	96.554	0.000
	Within groups	7.520	34	0.221		
	Total	28.876	35			
Nuvacron	Between groups	2.570	1	20570.000	0.009	0.925
	Within groups	97.290	34	50190.000		
	Total	97.290	35			
Asomido	Between groups	4.232	1	4.232	1.446	0.237
	Within groups	99.508	34	2.927		
	Total	103.740	35			
Thiodan	Between groups	0.618	1	0.618	0.194	0.662
	Within groups	108.391	34	3.188		
	Total	109.010	35			
Control	Between groups	143.469	1	143.469	50.734	0.000
	Within groups	96.147	34	2.828		
	Total	239.616	35			

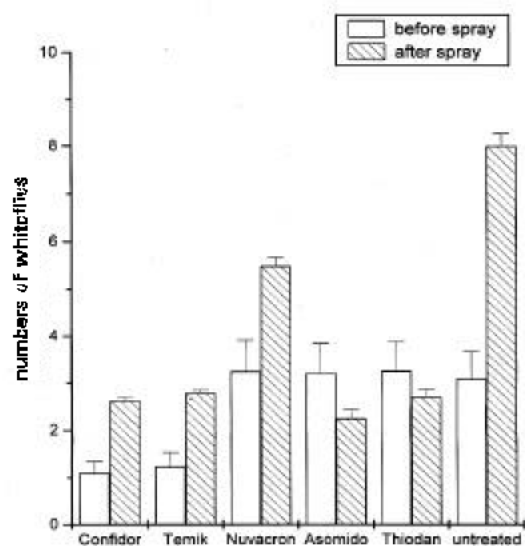


Fig. 1: Numbers of *B. tabaci* (Mean \pm 1 standard error) before and after spray on CIM-240, based on leaf survey in 1996.

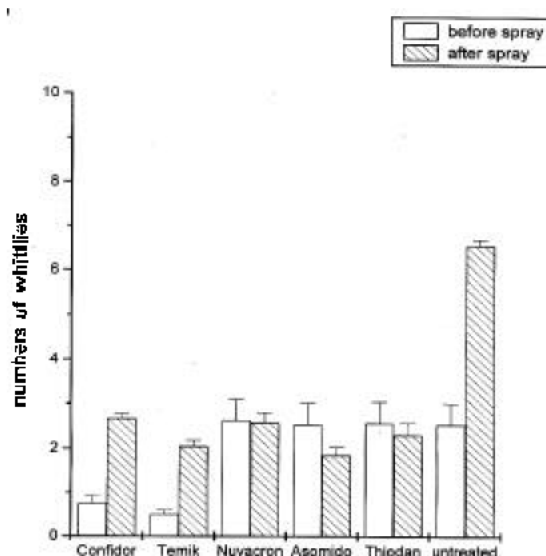


Fig. 2: Numbers of *B. tabaci* (Mean \pm 1 standard error) before and after spray on CIM-448, based on leaf survey in 1997.

Latif *et al.*: Efficacy of different insecticides against whitefly

Because the CIM-240 sown in 1996 and CIM-448 in 1997. The temperature below than 10°C and above 32°C deliberately effects population of whitefly and not suitable for their growth (Zalom *et al.*, 1985). It has been found that at average temperature of 28.9 °C and 87% relative humidity in the developmental period of whitefly on cotton was 12-27 days (Mirsa & Lamba, 1929). Heavy rains adversely effects the whitefly populations, and increase during dry seasons (Anzola & Lastra, 1985). There were non-significant difference found on the population density of whiteflies due to spray of Thiodan and Asomido. The Thiodan and Asomido are most effective against whitefly in both varieties. Overall, the efficacy of the all insecticides against whitefly play an important part in controlling as compared to the untreated crops (control treatment).

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