

## Field Evaluation of Different Insecticides for the Control of Mustard Aphid, *Lipaphis erysimi* (Kalt.) (Homoptera: Aphididae) on Mustard Crop

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**Abstract:** The studies on the evaluation of different insecticides for the control of mustard aphid, *Lipaphis erysimi* (Kalt.) on mustard crop were carried out in the field. The recommended doses of four insecticides viz., Thiodan 50EC (endosulfan), Kapaphos 400EC (profenofos), Xiangmen 60SL (methamidophos) and Monophos 40SCW (monocrotophos) were sprayed twice at fortnight intervals. The results on reduction percentages in the population of aphids indicated that all the insecticides had higher initial killing effects, however, Monophos was comparatively more toxic and persistent insecticide against this insect pest on mustard. The plots sprayed with Monophos yielded significantly higher than rest of the insecticides under trial.

**Keywords:** Evaluation, Mustard Aphid, Insecticides

### Introduction

Mustard, *Brassica juncea* Lin. is an important source of vitamins A,C,D and also contain appreciable amount of proteins, carbohydrates and fibers. In Sindh, it is grown on an area of 98.1 million hectares with an annual production of 82. 2 metric tones and an average yield of 838 kgs/ha (Anonymous, 2001). The mustard yield per hectare is very low in Pakistan as compared to other mustard growing countries of the world. Amongst the factors responsible for low yield, the insect pests play a significant role in reducing the yield. This crop is attacked by about 25 species of insect pests resulting in both quantitative and qualitative losses varying from 45.50% (Pradhan, *et al.*, 1960). Amongst them, mustard aphid, *Lipaphis erysimi* (Kalt.) is the most destructive insect pest. Both the nymphs and adults of this pest suck the cell sap from the leaves, stems and inflorescence of the developing pods. Due to the very high population of the pest, the vitality of plant is greatly reduced. The leaves acquire a curly appearance, flower fails to form pods and developing pods do not produce healthy seeds. The yield of an infested crop is reduced to one fourth or fifth (Atwal, 1986; Bhatt, 1996). The insecticides in the past have become ineffective against the mustard aphid which seems to be due to development of resistance against the prevalent insecticides, therefore, the present studies were conducted to determine the evaluation the efficacy of different insecticides against mustard aphid, *Lipaphis erysimi* (Kalt.) on mustard crop at Tando Jam.

### Materials and Methods

The studies on the evaluation of different insecticides for the control of mustard aphid, *Lipaphis erysimi* (Kalt.) on mustard crop were carried out in the field. The seeds of mustard variety S-9 were sown on November, 2000 by drilling method. The experimental plot was "Complete Randomized Block Design" with four replicates. Each replicate comprised of five sub-plots for respective insecticides including control (no-sprayed) and size of each plots was 28 x 25.5 sq. meter. The recommended doses of four insecticides viz., Thiodan 50EC (endosulfan), Kapaphos 400EC

(profenofos), Xiangmen 60SL (methamidophos) and Monophos 40SCW (monocrotophos) were sprayed twice on mustard at fortnight interval to assess their efficacy against mustard aphid. The first application was applied 30 days after sowing with the help of hard knapsack back mounted spray. The central four lines of each sub-plot were sprayed with respective insecticides and two lines on each side were kept as buffer zone. Care was taken to avoid mixing of the insecticides. The recommended cultural practices were performed throughout the growing season. Pre-treatment population of aphids was recorded 24-hours before each application. Post-treatment aphid counts were made 1-day, 2-days, 4-days, 7-days and 14-days of each application. For this purpose 10-plants were selected at random and tagged in each sub-plot for respective insecticide. Six leaves to each from top, middle and bottom part of the selected plants were scanned thoroughly for aphid counts. The data thus recorded was subjected to Henderson and Tilton (1955), formula to compute reduction percentages in aphid population after each application. The results thus obtained were subjected to statistical analysis of variance and NEW DMR test was applied for meaningful comparison of the different insecticides effect on aphid population.

### Results and Discussion

The results on the reduction percentages in the population of mustard aphid, *Lipaphis erysimi* (kalt.) after different time intervals of application are presented in Table 1. The data showed that the toxicity of insecticides varied significantly after 1-day of application and reduction percentages in the population of aphids were significantly higher in the plots sprayed with Monophos followed by Xiangmen, Kapaphos and Thiodan. The analysis of variance and application of CD values to mean reduction percentages caused by different insecticides indicated that the statistically significant variation amongst the insecticides under trial. The efficacy of emulcifiable concentrates for the control of aphid varied significantly with the insecticides, however, the pattern of effectiveness was similar after 1-

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day of application. Monophos and Xiangmen were comparatively more effective than Kapaphos and Thiodan. However, difference between all the four insecticides was statistically non-significant after 2-days of application. The data on the reduction percentages in population of aphids after 4-days of application revealed that it varied significantly with the insecticides. The reduction percentages was significantly higher from the plants sprayed with Monophos followed by Xiangmen, Kapaphos and Thiodan. The analysis of variance showed that the significant of variation amongst the insecticides lower, differences between Monophos and Xiangmen were non-significant at 5% level of probability. After 7-days of application organophosphate insecticides was comparatively more persistent than other insecticides. The reduction percentages in the population of aphids were significantly higher from plots sprayed with Monophos and its different with Xiangmen was statistically non-significant. However, their differences with Kapaphos and Thiodan were statistically significant both at 5% and 1% of significant. The reduction percentages in the population of aphid were recorded after 14-days of application varied significantly with other insecticides. The pattern of effectiveness was similar almost with other after different days of application. Monophos of insecticide was significantly more toxic than followed by Xiangmen, Kapaphos and Thiodan.

The analysis of variance showed that under trail, however variations between non-significant. Since a little work has yet been carried out under field conditions on the evaluation of different insecticides against insect pest of mustard aphid, *Lipaphis erysimi* (Kalt.), therefore, the results could not be discussed in detail. However, (Ahmed and Miah, 1989 and Batt, 1996), reported that the organophosphate insecticides were significantly more effective than the other individual insecticides.

**Yield:** The results on the yield of seed mustard were sprayed with different insecticides against mustard aphid in Table 2 indicated that it varied significantly with the insecticides. The yield of seed mustard (Kg/plot) was significantly higher from the plots sprayed with Monophos followed by Thiodan, Kapaphos, Xiangmen, and control. The results on the relative toxicity of different insecticides to aphid on mustard indicated that Monophos and Xiangmen were comparatively more toxic persistent than other insecticides. Such results on differential response of insecticides against *L. erysimi* had also been reported by many research workers (Ahmed and Miah 1989; Islam, *et al.*, 1990; Munshi, *et al.*, 1985. and Taman, 1990). The increase yield and reduced damage had also been reported by Batt (1996). It could, therefore, be inferred that Monophos and Xiangmen can be effectively applied to combat aphid pests on mustard crop.

Table 1: Reduction Percentage in the Population of *Lipaphis erysimi* (Kalt.) On Mustard Crop after Different Time Intervals of Application with Insecticides

Insecticides	Reduction percentage after				
	1-day	2-days	4-days	7-days	14 days
Thiodan	97.23d	97.08d	94.62d	91.88d	93.55d
Kapaphos	97.62c	97.28e	95.15c	92.41c	95.12c
Xiangmen	98.30b	98.15b	95.84b	93.04b	97.03b
Monophos	98.67a	98.36a	96.89a	95.04a	97.56a
CDI	0.16	0.05	0.11	0.15	0.73
CDI	0.22	0.07	0.16	0.21	1.05

Mean values in respective column followed by similar letters are statistically non-significant at 5% level.

Table 2: Effect of Insecticidal Treatments on Yield of Mustard Crop

Insecticides	Replicate				Total	Average yield (kg/plot)
	R1	R2	R3	R4		
Thiodan	2.100	2.50	2.360	2.490	9.2	2.300 d
Kapaphos	2.320	2.380	2.450	2.580	9.73	2.433 c
Xiangmen	2.400	2.550	2.600	2.650	10.2	2.550 b
Monophos	2.700	2.750	2.820	2.890	11.16	2.790 a
Check (Plot)	0.450	0.490	0.560	0.610	2.110	0.528 e

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