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Effect of Some Insecticides on Mustard Aphid, *Lipaphis erysimi* (Kaltenbach) in Field and Net House Conditions

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Abstract: Five organophosphorus insecticides viz., phosphamidon, quinalphos, malathion, dimethoate and diazinon were tested against mustard aphid, *Lipaphis erysimi* (Kaltenbach) in field and net house condition. All these insecticides significantly ($p < 0.05$) controlled mustard aphid. Quinalphos was comparatively more effective in controlling mustard aphid followed by phosphamidon. Dimethoate, diazinon and malathion showed more or less similar response against the mustard aphid.

Key words: Aphid, organophosphorus insecticides, *Lipaphis erysimi*

Introduction

The mustard aphid is world wide and is a serious pest of cruciferous oilseeds like mustard, linseed, rapeseed and *Brassica* vegetables like cabage, cauliflower, etc. Mustard is the main edible oil seed crop of Bangladesh. It is used not only as cooking oil but also as hair and body oil. It has manifold medicinal values as well. Its performance in total oil seed production in Bangladesh is approximately 70%. In Bangladesh, more than five lakh hectares land is under oil seed production of which more than three lakh hectares is under oil seed production, which yielding more than two lakhs metric tones of oil seeds (Anonymous, 1991). This crop grows more or less in all the districts of Bangladesh but cultivation of mustard is more in Comilla and other leading districts of mustard cultivation are Dhaka, Pabna and Rajshahi (Alam *et al*., 1988).

Nearly 70% of the total edible oil requirement in Bangladesh comes from the mustard oil. The total annual need of edible oil in Bangladesh is more than 4 lakh metric tones of oil. Among them mustard and other oil seed crops produces only one lakh metric ton of oil. Remaining three lakh metric tones of edible oil is being imported annually either as seed or oil at the expense of nearly 1000 crores taka (Khan, 1993).

Mustard suffered from the damage caused by a number of insect pests. Among them *Lipaphis erysimi* (Kaltenbach), commonly known as mustard aphid is the most destructive pest of mustard in Bangladesh. Both the nymphs and adults sucks cell sap from leaves, stems, inflorescence or the developing pods. Due to the very high population of the pest, the vitality of plants is greatly reduced. The leaves acquire a curly appearance, the flowers fail to form pods and the developing pods do not produce healthy seeds. The yield of an infested crop is reduced to one fourth or one fifth (Atwal, 1986). In Bangladesh and other areas of Indo-Pak subcontinent, foliar insecticides generally control insect pest of mustard. Aphid resistant variety of mustard has yet been screened out (Phadke and Prasad, 1990; Malik, 1988). Other control methods like cultural, biological are not well known to farmers. So, suitable insecticides for controlling mustard aphid are very essential. Hence, an attempt was adopted to study the effectiveness of some insecticides against mustard aphid.

Materials and Methods

A high yielding variety of mustard commonly known as 'Safal' was selected as a test crop. The experiment was conducted in a randomized block design at Bangladesh Agricultural University, Mymensingh during November 1999 to February 2000. The unit plot size was $4 \times 3m^2$ ($12m^2$), row to row spacing 0.25m, plot to plot distance 0.5m and 1m between the blocks. The total number of plot was 24 with 4 blocks and 6 plots in each block. The total area being $23 \times 21m^2$ ($48m^2$). In the field land was prepared with four ploughing followed by laddering and proper leveling. In the net house the pots were filled with the soil collected from the respective field of experiment site. The surface area of the soil in each plot was $0.05m^2$. Experimental plot and net house were fertilized within urea, triple super phosphate and murate of potash @ 260, 200 and 66 kg per hectare respectively during the final land preparation. Urea was used in three slit doses. Seeds of mustard crops were sown during first week of November at the rate of 7kg ha^{-1}. Field plots were irrigated after 31 days of sowing. In net house irrigation was done as per requirement. The experimental field was exposed to natural infestation and artificial infestation was done in net house. Five foliar insecticides viz., phosphamidon (Dimecron 100EC), quinalphos (Ekalux 40EC), malathion (Fynanon 57 EC), dimethoate (Roxion 40EC) and diazinon (Diazinon 60 EC) were procured from the local agent and sprayed at the rate of 0.075% active ingredient after 60 and 75 days of sowing both in field and net house condition. Before spraying in net house 20 aphids in each pot was supplied and covered by the nets. One control batch was also maintained. Twenty plants were randomly selected from each plot. Each plant was tagged. The number of infested and uninfested plants in those plots was counted. The number of aphid was counted with the help of a magnifying glass, five days after first spraying. Second spray was done after 10 days of first spraying and number of aphid was counted again after 10 days of second spraying. Analysis of variance (ANOVA) was done according to Zar (1999)

Results and Discussion

After 5 days of the first dose of insecticide application minimum aphid was found both in field and in net house experiment due to quinalphos treatment (15% and 2 out of 20 aphids infested to each tagged plant respectively) followed by phosphamidon (23.75% and 3 out of 20). Maximum aphid was found in control plot both in field (71.21%) and net house (175, increased from 20 aphid). In both, field and net house, dimethoate, diazinon and malathion treated plot computed third (28.50%and 4 aphid), fourth (40.25% and 6 aphid) and fifth (45.25% and 7 aphid) in order respectively. All the five insecticides were significantly effective to kill aphids. Regarding aphid mortality, quinalphos was significantly

Table 1: Effect organophosphorus insecticides against mustard aphid in the field

Insecticides	Formulation	Dose %	% of infested plant by aphid		
			Pretreatment 45 days	1st spray 5 DAT	2nd spray 10 DAT
Phosphamidon	Dimercon 100EC	0.075	53.3	23.75e	10d
Quinolphos	Ekalux 25 EC	0.075	75.0	15.00f	5e
Malathion	Fynanon 57 EC	0.075	62.5	42.25b	21b
Dimethoate	Roxion 40 EC	0.075	60.0	28.50d	15c
Diazinon	Diazionon 60 EC	0.075	62.5	40.25c	18bc
Control	-----	-----	59.2	71.21a	85a
LSD (0.05)	-----	-----	-----	3.45	3.42

DAT = Days after treatment Figures in a column have same letter is not significantly differ.

Table 2: Effect of organophosphorus insecticides against mustard aphid in net house

Insecticides	Formulation	Dose %	% of infested plant by aphid		
			Pretreatment 45 days	1st spray 5 DAT	2nd spray 10 DAT
Phosphamidon	Dimercon 100EC	0.075	20	3c	2c
Quinolphos	Ekalux 25 EC	0.075	20	2c	1c
Malathion	Fynanon 57 EC	0.075	20	7bc	4bc
Dimethoate	Roxion 40 EC	0.075	20	4c	2c
Diazinon	Diazionon 60 EC	0.075	20	6c	3c
Control	-----	-----	20	175a	160a
LSD (0.05) 3.004	-----	-----	-----	9.003	

DAT = Days after treatment. Figures in a column have same letter is not significantly differ.

($p < 0.05$) best in both field (15.00% aphid) and net house (2 aphid) followed by phosphamidon in both field (23.75%) and net house (3 aphid). Dimethoate, diazinon and malathion were third, fourth and fifth in order of effectiveness in field (28.50, 40.25 and 45.25% aphid respectively) and in net house. Dimethoate, diazinon and phosphamidon showed similar effectiveness (4,6 and 3 aphid respectively) to quinalphos (2 aphid), while malathion was the least effective insecticide. At 10 days after second spray the aphid mortality was maximum in quinalphos treated plot both in field (5% aphid) and in net house (1 aphid), followed by phosphamidon in both field (85% aphid) and net house (160 aphid). Dimethoate, diazinon and malathion were third, fourth and fifth in order of effectiveness in field 15, 18 and 21% of aphid respectively) and in net house dimethoate and diazinon showed statistically similar effect (2 and 3 aphid) to quinalphos and malathion was the least effectiveness among the insecticide used (Table 1 and 2). The order of effectiveness of insecticides in field and net house was quinalphos, dimecron, dimethoate, diazinon and malathion respectively.

Hussain *et al.* (1988) reported that Azodrin (monocrotophos) and Zithiol (malathion) were best for mustard aphid control. Ahamad and Miah (1990) reported that ripcord (cypermethrin) at the dose of 1ml/liter and zolone (Phosalone) at 2ml/liter were most suitable component for control of mustard aphid. Alam *et al.* (1964) found promising result with the application of dimecron followed by perfection in controlling winter aphid *Lipaphis pseudobrassicae* Dav. Begum *et al.* (1991) found promising results with disulfoton, quinalphos and cataphydrochloride against mustard aphid *Lipaphis erisimi* Kalt. Cook *et al.* (1963) found that application of disulfoton granules gave adequate protection against pea aphid *Macrosiphum pisi* (Harris) for about three week.

Six insecticides, permethrin, cypermethrin, fenpropathrin, sumicidin (fenvelarate) decamethrin (deltamethrin) and endosulfan were tested for their biological activity against *Aphis melifera* in the laboratory and in field. Endosulfan 35 EC was the least toxic, followed by deltamethrin 28EC, fenvelarate 20EC, fenpropathrin 10EC, cypermethrin 10EC and permethrin 25EC, in that order (Thakur *et al.*, 1989). Khurana and Batra (1989) studied the effectiveness of 13 insecticides in controlling *Lipaphis erysimi* on late sown mustard and reported that oxydemeton methyl, monocrotophos, cypermethrin and fevelarate were the most effective of the insecticides tested. Singh and Singh (1989) reported that the effectiveness of several insecticidal treatments against *Lipaphis erysimi* Kalt. on raddish. Lowest number of the pests was observed in plots treated with monocrotophos at 1000 + 300 g ha^{-1} or phorate with monocrotophos at 1000 + 300 g ha^{-1}

Effective control of aphid, *Brevicoryne brassicae* infesting cabbage and cauliflower has been obtained for more than 26 day with phorate granules (Andrews *et al.*, 1969) Hopkins *et al.* (1959); Hanna (1958) and Adkisson (1958) reported excellent control of cotton aphids and thrips after application of phorate and disulfoton granules gave adequate protection against pea aphid, *Macrosiphum pisi* (Hanis), for about three weeks. Baccon (1960) and Gerhardt (1961) found that soil application of 10% granules of phorate or disulfoton at planting time of potato crop gave good control of potato psylid, *Paratrioza cockerelli* (Sulzar) for 80 days. Shrivastava and Singh (1976) also reported that effectiveness of dimethoate 0.03% in controlling *Aphis cracivora* on pulses.

Reviews of the above work and results obtained in this study revealed that quinalphos (Ekalux 25EC) and phosphamidon (Dimecron 100EC) may effectively be used in accurate time for the control of mustard aphid, *L. erysimi* in mustard in Bangladesh

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