Curr. Agric. Vol. 29, No. 1-2, 2005, 79-82.

RELATIVE EFFICACY OF SOME NEWER INSECTICIDES AGAINST MUSTARD APHID, *Lipaphis erysimi* (KALT.)

S.L. Jat and B. Singh
Deptt. of Entomology, Raj. Agril. University, Bikaner, Campus, S. K. N. College of Agriculture, Jobner- 303329

ABSTRACT

The efficacy of nine insecticides tested against mustard aphid, revealed that dimethoate (0.03%) proved to be the most effective, followed by imidacloprid (0.005%) and acephate (0.05%). The endosulfan (0.07%), thiamethoxam (0.005%), profenofos + cypermethrin (0.04%) and profenofos (0.05%) were ranked middle in order of their efficacy whereas, the Neem based formulations, *viz.*, N.S.K.E. (5.0%) and Margocide CK (5 ml/l) were proved to be the least effective in reducing the aphid population. The total avoidable losses and percent avoidable losses were recorded zero in the plots treated with dimethoate (0.03%), while maximum in N.S.K.E. (5.0%) and Margocide CK (5 ml/l). The highest benefit cost ratio (19.56) was found in the treatment of dimethoate 0.03 per cent followed acephate 0.05 per cent (15.81) while; it was minimum (1.76) in Margocide CK (5 ml/l).

INTRODUCTION

Mustard, *Brassica juncea* Linn. (Czern. and Coss.) is an important oilseed crop of family Cruciferae. It is mainly grown in *rabi* season as oilseed, condiment and medicinal crop. The green leaves and stems of mustard are good source of green vegetables and fodder as they are rich in protein, minerals, vitamin A and C. The oil content in seeds ranges from 32 to 42 per cent, used for edible purposes. The seeds and oil of mustard have a peculiar pungency, thus making it suitable for condiments and for the preparation of pickles, curries and vegetables.

Mustard aphid, *Lipaphis erysimi* (Kalt.) one of the most serious pest of this crop (Rai, 1976 and Bakhetia, 1986), caused 9.0-95.0 per cent losses in seed yield and averaged 15.0 per cent in its oil at different states of India (Rohilla *et al.*, 1987 and Singh and Sachan, 1994). This pest alone can devastate the entire mustard crop. On the basis of economic importance, mustard aphid is considered as a key pest (Bakhetia and Sechan, 1989). Perusal of literature reveals that insecticidal recommendations are available for protecting this crop from aphid attack, but they are highly toxic to natural enemies and cause environmental pollution (Rathod and Bapodra, 2002). In the present studies a field experiment was carried out to determine the effectiveness of newer insecticides and some plant products against mustard aphid and their toxic effects on predator *Coccinella septempunctata* Linn.

MATERIAL AND METHODS

The field experiment was carried out during *rabi* 2003-2004 at S.K.N. College of Agriculture, Jobner, Rajasthan. The experiment was laid out in a randomized block design (RBD) with three replication and ten treatments including control (table 1). The first insecticidal spray was given on when sufficient aphid population had buildup and the second after three weeks of first spray. The population of aphid was recorded from five randomly selected tagged plants in each plot one day before the spray and 1, 3, 7 and 15 days after spraying. The cost benefit ratio was worked out from the cost of plant protection and benefit derived due to higher seed yield in protected plots over unprotected plot. The data were subjected to statistical analysis for interpretation of results.

RESULTS AND DISCUSSION

Efficacy of insecticides against mustard aphid

Taking into account an over all performance of the insecticides on mean aphid population it is evident from Table 1 that all the insecticidal treatments were found significantly superior over untreated control in reducing aphid population. The treatment of dimethoate (0.03%) followed by imidacloprid (0.005%) was found to be the most effective which corroborates with the findings of Singh *et al.* (1987), Patel and Jhala (1998) and Srinivasa and Sharma (2003).

Table 1. Bioefficacy of insecticides against aphid, *L. erysimi* on mustard crop

Insecticides	Conc. (%)	Per cent reduction in aphid population, After days								
		First application				Second application				
		1	3	7	15	1	3	7	15	Mean yield (q ha^{-1})
Imidacloprid 17.8 S.L.	0.005	74.66 (59.78)	96.21 (79.06)	93.50 (75.26)	65.22 (53.86)	72.34 (58.27)	95.92 (78.40)	98.52 (83.12)	99.92 (88.69)	18.50 (25.48)
Thiamethoxam 25 WG	0.005	62.12 (52.02)	92.62 (74.28)	87.11 (68.96)	51.15 (45.67)	64.98 (53.72)	91.31 (72.88)	94.34 (76.26)	96.52 (79.34)	16.30 (23.81)
Profenofos 50 EC	0.05	61.55 (51.68)	90.40 (71.98)	84.84 (67.12)	46.94 (43.26)	62.64 (52.32)	89.53 (71.14)	92.66 (74.32)	94.04 (75.92)	14.10 (22.05)
Profenofos 40 EC + Cypermethrin 4 EC	0.04	61.89 (51.88)	92.16 (73.78)	86.20 (68.22)	49.82 (44.92)	64.03 (53.15)	90.44 (72.02)	93.17 (74.88)	94.22 (76.12)	15.20 (22.95)
Dimethoate 30 EC	0.03	75.02 (60.05)	96.81 (80.10)	93.68 (75.55)	65.48 (54.02)	74.20 (59.48)	96.22 (78.85)	98.64 (83.67)	99.93 (88.76)	18.70 (25.62)
Acephate 75 EC	0.05	68.83 (56.08)	94.21 (76.08)	91.12 (72.75)	58.44 (49.86)	66.98 (54.93)	95.07 (77.20)	96.44 (79.20)	98.79 (83.70)	17.40 (24.65)
Endosulfan 35 EC	0.07	64.75 (53.58)	93.97 (75.82)	87.80 (69.56)	52.32 (46.33)	65.91 (54.23)	91.80 (73.38)	95.00 (77.09)	97.42 (80.79)	17.30 (24.58)
N.S.K.E.	5.00	46.90 (43.22)	75.38 (60.26)	65.24 (53.90)	15.80 (23.41)	48.25 (43.99)	64.12 (53.20)	78.91 (62.67)	83.17 (65.78)	12.40 (20.62)
Margocide C.K. 20 EC	5 ml/l	50.89 (45.52)	77.29 (61.54)	66.15 (54.44)	16.81 (24.21)	48.71 (44.26)	66.42 (54.60)	82.07 (64.95)	84.53 (66.84)	13.10 (21.22)
Control	-	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	10.38 (18.79)
SEm±		1.31	1.34	1.11	1.36	1.32	1.40	1.35	1.52	0.59
CD (P = 0.05)		3.92	4.00	3.31	4.07	3.95	4.18	4.03	4.55	1.76

Data presented are means of three replications Figures in parentheses are angular transformed values.

The treatments of acephate (0.05%) and endosulfan (0.07%) were observed effective next to dimethoate (0.03%) and imidacloprid (0.005). These results are in agreement with that of Gour and Pareek (2003) who reported that acephate (0.05%) was effective in controlling the aphid, imidacloprid (0.05%) and endosulfan (0.07%) as moderately effective insecticides. The treatments of thiamethoxam (0.005%), profenofos + cypermethrin (0.04%) and profenofos (0.05%) were found moderately effective

group of insecticides. The neem based formulations *viz.*, N.S.K.E. (5.0 %) and Margocide CK (5 ml/l) proved to be the least effective in controlling the aphid on mustard. Patel and Jhala (1998) and Gami *et al.* (2002), also reported similar results.

Economics of insecticidal application

The yield data presented in Table 2 indicated that highest seed yield (18.70 q ha^{-1}) was recorded in dimethoate (0.03%) followed by imidacloprid (0.005%) and acephate (0.05%) resulted in 18.5 and 17.4 q ha^{-1} respectively. While minimum (12.40 q ha^{-1}) was recorded in N.S.K.E. similarly, the per cent avoidable losses was zero in dimethoate followed by imidacloprid (1.07%) and acephate (6.95%) and maximum in N.S.K.E. (33.69%). Based on the cost benefit ratio, dimethoate (0.03%) was found to be the most economic treatment with 1 : 19.56 CB ratio. Similar observation was also made by Gour and Pareek (2003).

Table 2. Assessment of losses caused by aphid, *L. erysimi* on mustard, increased in yield over control and benefit-cost ratio

Insecticides	Conc. (%)	Yield (q ha^{-1})	% avoidable losses	% increase in yield over control	Return of increased yield (Rs)'	Total cost of expenditure (Rs)''	Net profit (Rs ha^{-1})	Benefit cost ratio
Imidacloprid 17.8 S.L.	0.005	18.50	1.07	78.23	13804	1664.0	12140.0	7.30
Thiamethoxam 25 WG	0.005	16.30	12.83	57.03	10064	1550.4	8513.6	5.49
Profenofos 50 EC	0.05	14.10	24.60	35.84	6324	996.0	5328.0	5.35
Profenofos 40 EC + Cypermethrin 4 EC	0.04	15.20	18.73	46.43	8194	1259.0	6935.0	5.50
Dimethoate 30 EC	0.03	18.70*	0.00	80.15	14144	688.0	13456.0	19.56
Acephate 75 EC	0.05	17.40	6.95	67.63	11934	710.0	11224.0	15.81
Endosulfan 35 EC	0.07	17.30	7.49	66.67	11764	1002.0	10762.0	10.74
N.S.K.E.	5.00	12.40	33.69	19.46	3434	480.0	2954.0	6.15
Margocide C.K. 20 EC	5ml/litre	13.10	29.95	26.20	4624	1675.0	2949.0	1.76
Control	-	10.38	44.49	0.00	-	-	-	-

* Highest yield in the treated plots

' Cost of mustard seed at current season was Rs. 1700 per q.

'' It includes cost of insecticides and labour charges

Ack. The authors are grateful to the Head, Department of Entomology and Dean, S.K.N. College of Agriculture, Jobner for providing necessary facilities for investigation.

REFERENCES

Bakhetia, D.R.C. 1986. Pest management in rapeseed and mustard. Pesticides 20 (5) : 32-38.

Bakhetia, D.R.C. and Sechan, B.S. 1989. Insect pest and their management in rapeseed - mustard. J. Oilseeds Res., 6 : 269-299.

Gami, J.M.; Bapodra, P.G. and Rathad, R.R. 2002. Chemical control of mustard aphid, Lipaphis erysimi (Kalt.). Indian J. Plant Prot., 30 (20) : 180-183.

Gour I.S. and Pareek B.L. 2003. Field evaluation of insecticides against mustard aphid, Lipaphis erysimi (Kalt.) under semi-arid region of Rajasthan. Indian J. Plant Prot., 31 (2) : 25-27.

Patel, G.P. and Jhala, R.C. 1998. Field efficacy of synthetic and botanical pesticides against aphid, Lipaphis erysimi (Kalt.) on radish. Proceeding of the Entomology in 21st Century, held at R.C.A., Udaipur. pp. 77-78.

Rai, B.K. 1976. Pest of oilseed crop in India and their control. Indian Council of Agricultural Research (ICAR), New Delhi, pp. 121.

Rana, J.S.; Khakhar, K.S. and Dahiya, K.K, 1995. Pattern of predation of mustard aphid, Lipaphis erysimi (Kalt.) by lady bird beetle, Coccinella septempunctata Linn. on mustard crop. Crop Res., 10 (1) : 85-89.

Rathod, R.R. and Bapodra, J.G. 2002. Relative toxicity of various insecticides to coccinellid predators in cotton. Indian J. Plant Prot., 30 (1) : 29-31.

Rohilla, H.R.; Singh, H.; Kalra, V.K. and Kharub, S.S. 1987. Losses caused by mustard aphid, Lipaphis erysimi (Kalt.) in different Brassica genotypes. Proc. 7th Inter. Rapeseed Cong., 5 : 1077-1083.

Saharia, D. 1984. The population dynamics of mustard aphid, Lipaphis erysimi (Kalt.) in Assam. J. Res. Assam Agric. Uni., 5 (1) : 79-83.

Singh, C.P. and Sachan, G.C. 1994. Assessment of yield loss in yellow sarson due to mustard aphid, Lipaphis erysimi (Kalt.). J. Oilseeds Res., 11 (2) : 179-184.

Singh, H., Rohilla, H.R. and Kharub, S.S. 1987. Integration of chemical control of mustard aphid, Lipaphis erysimi (Kalt.) and safety to pollinators. Ann. Biol., 3 (1) : 105-106.

Srinivasa, B. and Sharma, A.K. 2003. Compatibility of a newer insecticide, Imidacloprid with propiconazole against aphid and their coccinellid predators of wheat ecosystem. Indian J. Ent., 65 (2) : 287-291.