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Efficacy and economics of different insecticides against mustard aphid (*Lipaphis erysimi*) on brown sarson (*Brassica compestris*)

D N MISHRA[1] and VIVEK YADAV[2]

Sardar Vallabhbhai Patel University of Agriculture and Technology, Zonal Research Station, Nagina, Bijnor, Uttar Pradesh

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Mustard is an important oilseed crop and constitute the major source of edible oil for human consumption. According to Bakhetia and Sekhon (1989), 38 insect pests are known to be associated with rapeseed-mustard crop in India in which mustard aphid (*Lipaphis erysimi* Kalt) is the key pest and losses due to this pest vary with environmental factors. The climatic factors such as temperature, rainfall, relative humidity and sunshine usually influence the infestation of this insect greatly. Pest management recommendation emphasized the economic and ecological importance of justifying pesticide use. The cost of pest management should be less than crop loss. *L. erysimi* causes 35.4 to 73.3% yield loss, 30.09% seed weight loss and 2.75% oil loss as reported by Singh and Premchand (1995) and Sharma and Kashyap (1998). The relation between pest density and crop damage will be influenced by selection of a suitable pesticide and time of application. The present studies were therefore undertaken to find out suitable pesticide for control of mustard aphid keeping in view economics too.

The experiment was carried out at Zonal Research Station, Nagina of Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut during *rabi* 2009-10 and 2010-11. The soil of the experimental site was sandy loam in nature having pH 7.6. organic carbon 0.51, available nitrogen 190 kg/ha, available phosphorus 19.80 kg/ha and available potash 427 kg/ha. Mustard variety Varuna was sown with an spacing of 45 cm × 15 cm in the month of November in randomized block design with three replications. The crop was fertilized with 120: 60:40 kg NPK/ha , respectively. Half dose of nitrogen and full dose of phosphorus and potash was applied as basal, remaining half of the nitrogen was applied in two splits, half at first irrigation and half at second irrigation. The experiment comprised eight treatments, viz. T1, Imidacloprid @ 1ml/l of water, T2, Metasystox @ 1.5 ml/l of water, T3, Methamaxason @ 0.25g/l of water, T4, Lamdacyohalothrine @ 1.5 ml/l of water, T5, Fenvelvarate @ 1.5 ml/l of water, T6, Monocrotophos @ 1.5 ml/l of water, T7, Profenophos @ 1.5

Table 1 Effectiveness of insecticidal treatments in controlling aphids

Treatment	2009-10		2010-11	
	Number of aphid/ 10 cm terminal twig after one week of Ist spray	Number of aphid/ 10 cm terminal twig after one week of IInd spray	Number of aphid/ 10 cm terminal twig after one week of Ist spray	Number of aphid/ 10 cm terminal twig after one week of IInd spray
T1 -Imidacloprid @ 1ml/l of water	6.0	5.00	7.00	5.6
T2- Metasystox @ 1.5 ml/l Of water	9.0	7.00	10.0	7.3
T3- Methamaxason @ 0.25g/l of water	8.3	7.3	9.3	8.0
T4- Lamdacyohalothrine @ 1.5 ml/l of water	11.0	7.6	12.0	8.6
T5- Fenvelvarate @ 1.5 ml/l of water	19.6	15.0	21.6	15.6
T6- Monocrotophos @ 1.5 ml/l of water	24.6	17.0	26.3	18.3
T7- Profenophos @ 1.5 ml/l of water	28.3	26.6	32.6	27.0
T8- Control spray of water	60.3	66.6	61.0	69.3
CD (P=0.05)	2.24	3.62	3.68	3.17

[1] Associate Professor (Entomology), [2] Junior Agronomist (e mail: vivekzrsnagina@gmail.com)

Table 2 Seed yield (q/ha) and insecticidal efficiency as affected by different insecticides

Treatment	Seed yield (q/ha)		Increase in yield over control (q/ha)		Insecticidal efficiency (%)	
	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11
T1 -Imidacloprid @ 1ml/l of water	15.40	14.10	6.14	5.77	39.87	40.92
T2- Metasystox @ 1.5 ml/l Of water	12.00	11.10	2.74	2.77	22.83	24.95
T3- Methamaxason @ 0.25g/l of water	13.10	12.00	3.84	3.67	29.31	30.58
T4- Lamdacyohalothrine @ 1.5 ml/l of water	11.50	10.5	2.24	2.17	19.47	20.66
T5- Fenvelvarate @ 1.5 ml/l of water	11.00	10.0	1.74	1.67	15.81	16.70
T6- Monocrotophos @ 1.5 ml/l of water	10.83	9.80	1.57	1.47	14.49	15.00
T7- Profenophos @ 1.5 ml/l of water	10.96	9.93	1.70	1.60	15.51	16.11
T8- Control spray of water	9.26	8.33				
CD (P=0.05)	0.42	0.40				

ml/l of water, T8, Control spray of water.

The incidence of aphid was observed on 10 randomly predetermined tagged plants in each plot. As soon as the aphid appeared in the field, the insecticides were sprayed as per treatment and second spray was done 20 days after the Ist spray. The absolute population of mustard aphid was counted on 10cm terminal twig of 10 plants/plot, after one week of first and second spray of insecticide. Then the mean aphid population, increase in yield over control and insecticidal spray efficiency were calculated.

$$\text{Insecticidal efficiency} = \frac{A-B}{A} \times 100$$

where, A, grain yield of treated plot; B, grain yield of control plot

The incidence of mustard aphid appeared to pod filling stage of the crop under agro-climatic conditions prevailing in the area. Aphid was observed in the epidemic form during both the seasons. The incidence of aphid was comparatively higher during 2010-11 than 2009-10. Terminal part of plant carried higher number of aphid than the lower and middle part of the plant.

Significantly lower aphid population was observed in all treated plots as compared to untreated plot after first and second spray of insecticides during both the years. Aphid infestation in various treatments revealed that application of Fenvelvarate, Monocrotophos and Profenophos were less effective as compared to Imidacloprid, Metasystox,

Table 3 Economics as affected by different insecticides

Treatment	Additional Income (₹/ha)		Cost of Insecticidal application (₹/ha)		Additional Net income (₹/ha)		Additional cost: benifit	
	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11
T1- Imidacloprid @ 1ml/l of water	13 047.50	12 405.50	1 275.00	1 275.00	11 772.50	1 130.50	1: 9.2	1:8.7
T2- Metasystox @ 1.5 ml/l of water	5 822.50	5 955.50	825.00	825.00	4 997.50	5 130.50	1:60	1:6.2
T3- Methamaxason @ 0.25g/l of water	8 160.00	7 890.50	1 100.00	1 100.00	7 060.00	6 790.50	1: 6.4	1:6.2
T4- Lamdacyohalothrine @ 1.5 ml/l of water	4 760.00	4 665.50	862.50	862.50	3 897.50	3 803.00	1:4.5	1:4.4
T5- Fenvelvarate @ 1.5 ml/l of water	3 697.00	3 590.50	750.00	750.00	2 947.50	2 840.50	1:3.9	1:3.8
T6- Monocrotophos @ 1.5 ml/l of water	3 336.25	3 160.50	862.50	862.50	2 473.75	2 298.00	1:2.9	1:2.7
T7- Profenophos @ 1.5 ml/l of water	3 612.50	3 440.00	960.00	960.00	2 652.50	2 480.00	1:2.8	1:2.6
T8- Control spray of water								
CD (P=0.05)								

Grain price : ₹ 2 125/q in 2009-10 and ₹ 2 150/q in 2010-11

Methamaxason and Lamdacyohalothrine for controlling the aphid during both the years.

Minimum aphid population/plant was observed in first count with use of Imidacloprid @1.0 ml/lit of water however, in second count the application of Imidacloprid, Metasystox, Methamaxason and Lamdacyhalothrine were found statistically at par during both the years (Table 1). During 2009-10, highest seed yield (15.40 q/ha) was recorded with application of imidacloprid followed by Methamexason (13.10 q/ha). Increase in seed yield was in these treatment was mainly due to less aphid population in theses treatment in comparison to other treatments. Similar trend of results we also reported by Sekhon and Bakhetia (1994), Gour and Pareek (2003), Choudhary and Pal (2005) and Patel (2006). Lowest seed yield 9.26 q/ha was recorded with control treatment. Increase in seed yield due to application of Imidacloprid and Methamexason was 6.14 and 3.14 q/ha with insecticidal efficiency of 39.87 and 29.31%, respectively over control. Similar trends of results of seed yield and insecticidal efficacy were also recorded during 2010-11 (Table 2).

Based on the yield increase over control and cost incurred in the insecticidal application for aphid control in various treatments, the cost benefit ratio indicated that maximum profit 1:9.2 and 1:8.7 was found under Imidacloprid 21 ml/ lit of water during both the years followed by Metasystox @ 1.5 ml/l of water and Methamaxason 0.25 g/l of water during both the years (Table 3). The application of Monocrotophos and Profenophos were found least profitable.

SUMMARY

A experiment was carried out at Zonal Research Station, Nagina of Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut during rabi 2009-10 and 2010-11 to find out efficacy and economics of different insecticides against mustard aphid. It is revealed from the results that increase in seed yield due to application of imidacloprid and methamexason was 6.14 and 3.14 q/ha with insecticidal efficiency of 39.87 and 29.31 percent , respectively over control. Highest cost: benefit ratio 1.92 and 1.87 was also incurred with application of Imidacloprid during first and second year respectively.

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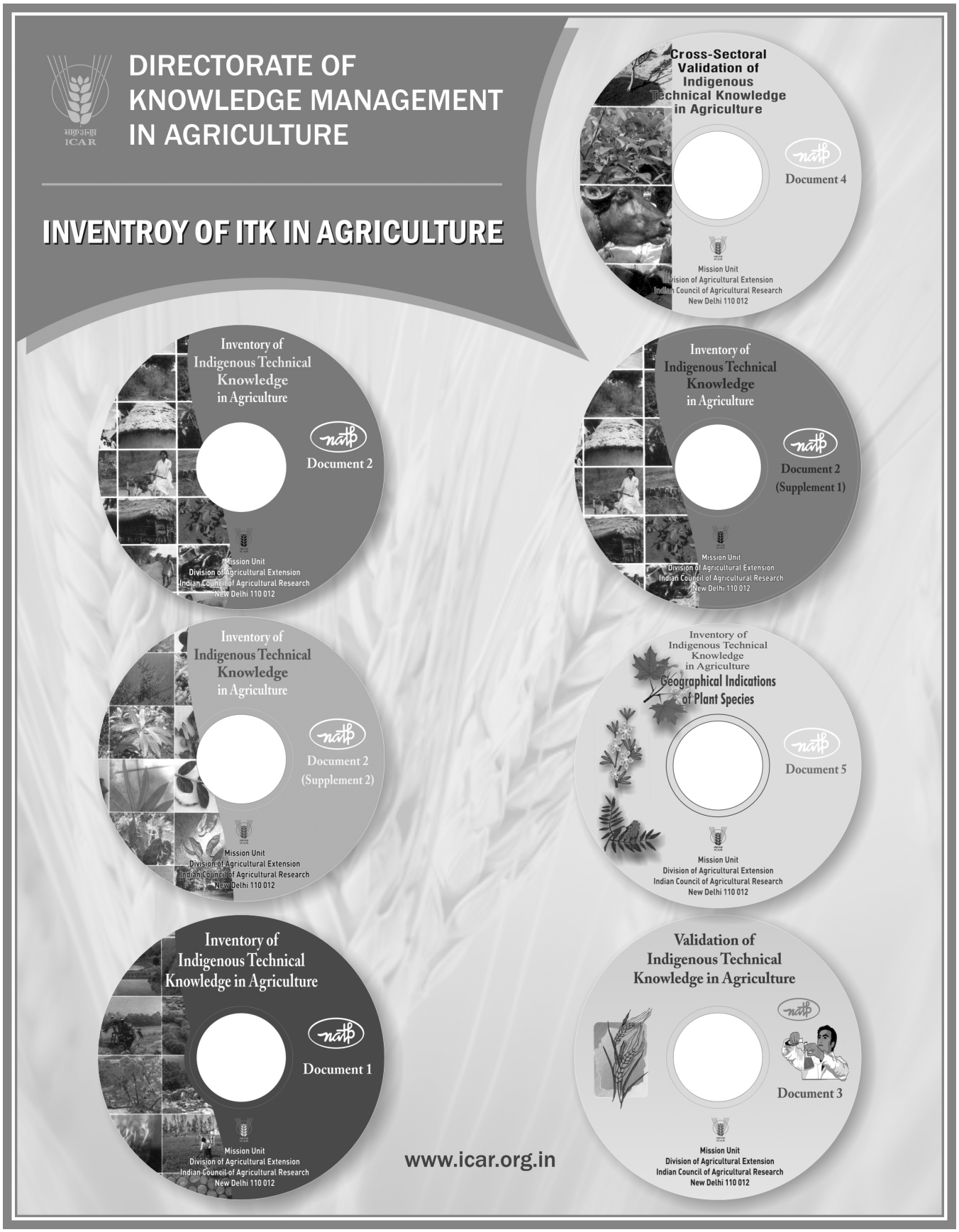
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