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# EFFICACY OF SOME NOVEL PESTICIDES AGAINST MUSTARD APHID

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**ABSTRACT**

*Brassica* oilseed crops are the major *Rabi* oilseed crops grown in India, which are collectively referred to as rapeseed-mustard. Several insect pests attacking the *Brassica*. Among them mustard aphid, *Lipaphis erysimi* is the most serious pest causing up to 97.0 per cent yield loss.Therefore six newer insecticides were tested against this insect. the aphid population in thiomethoxam treated plots was minimum (0.24 aphids/10cm apical shoot) which was statistically at par with imidacloprid treatment with 99.33 and 98.50 per cent reduction in population. While minimum reduction (94.84 percent) of aphid population was recorded in fipronil 5SC treatment at days after spraying. The highest cost benefit ratio was observed from imidacloprid 17.8SL@20g ai/ha (1:18.54) followed by thiamethoxam 25WG@25gm a.i./ha (1:17.62)

***Key words***: *Brassica, Lipaphis erysimi,* insecticide

## INTRODUCTION

*Brassica* oilseed crops are the major *Rabi* oilseed crops grown in India, which are collectively referred to as rapeseed-mustard. They occupy the important place among oilseed crops. They meet dietary requirement of approximately 50% of the population belong to the Uttar Pradesh, Punjab, Rajasthan, Madhya Pradesh, Bihar, Orissa, West Bengal and Assam states of India (Singh, 1999). Several insect pests attacking the *Brassica* (Bakhetia and Sekhon, 1989). Among them mustard aphid, *Lipaphis erysimi* (Kaltenbach) is the most serious pest causing up to 97.4 per cent yield loss (Patel *et al*., 2004). Use of chemicals to bring down the population of this noxious pest is required as it appears with a very high population in the conducive environment. The fecundity of mustard aphid is also very high. Therefore present investigation was carried out to observe the efficacy of some newer insecticides against *L. erysimi*. In addition to this, phytotonic effect of this chemical was also observed in mustard.

## MATERIAL AND METHODS

Field experiment was conducted during rabi season at farmer's field of Simbhaoli village of Hapur District U.P. in Randomized Block Design with six insecticides; Fipronil 5SC @ 50g a.i./ha, Imidacloprid 17.8SL @ 20g a.i./ha, Acephate 75SP @ 350g a.i./ha, Dimethoate 30EC @ 300g a.i./ha, Thiamethoxam 25WG @ 25g a.i./ha, Oxy-dematon methyl 25 EC @ 250g a.i./ha with control (Without spray). Each treatment was replicated three times. Plot size was 4.2x 3.0 $m^2$ with row to row and plant to plant distance 30 and 10 cm, respectively. Mustard crop was grown following standard agronomic practices. Population of aphid was counted on ten randomly selected plants from top 10 cm apical shoot with the help of magnifying hand lens by tally counter. Aphids were counted at before, 3, 7 and 10 days after spray (DAS) from each plot. The per cent population reduction was calculated on the mean population before spray. Yield was taken from net plot area leaving 30cm as border and calculated as kg per hectare. Data were subjected to ANOVA. Cost benefit ratio was calculated on the basis of local market price of mustard (Rs. 29/kg), insecticide, labour and pesticide application equipment rent charges etc.

## RESULTS AND DISCUSSION

The pre treatment population of aphid was homogeneous as it ranged from 32.46 to 34.66 aphid/10cm apical shoot (table 1). All insecticidal treatments significantly reduced the aphid population at third day. While in control the population was recorded to be increased. Third day after application of all insecticides, the lowest population was 2.50 in thiomethoxam treated plots to followed by 3.16, .53and 3.96 aphids/10cm shoot with 90.26, 89.40 and 88.01 per cent reduction in oxy-dematon methyl, imidacloprid and acephate treated plots, respectively. While fipronil treated plots had 6.50 aphids/10cm with only 80.90 percent reduction. Data on seventh day after spray also showed the decreasing pattern of aphid population in all treatments. The lowest population was in imidacloprid treated plots with 95.92 percent reduction followed by thiomethoxam and oxy-demeton methyl with 95.38 and 93.13 percent reduction in aphid population, respectively. At 10 days after spraying the aphid population in thiomethoxam treated plots was minimum (0.23 aphids/10cm apical shoot) which was statistically at par with imidacloprid treatment with 99.33 and 98.50 per cent reduction in population. While

**Table 1: Efficacy of different treatments against mustard aphid, *L. erysimi***

| Treatments | Number of aphids/10 cm epical shoot of plant | | | | | | | Yield (kg/ha) | Increase in yield (%) |
|---|---|---|---|---|---|---|---|---|---|
| | Before Spray | 3DAS | % Reduction | 7DAS | % Reduction | 10DAS | % Reduction | | |
| $T_1$ Fipronil 5SC @ 50g a.i./ha | 34.06 | 6.50 | 80.92 | 3.53 | 89.64 | 1.76 | 94.83 | 1416.30 | 31.88 |
| $T_2$ Imidacloprid 17.8 SL @ 20g a.i./ha | 33.33 | 3.53 | 89.40 | 1.36 | 95.92 | 0.50 | 98.50 | 1373.56 | 27.90 |
| $T_3$ Acephate 75SP @ 350g a.i./ha | 33.03 | 3.96 | 88.01 | 2.53 | 92.34 | 0.86 | 97.40 | 1309.23 | 21.91 |
| $T_4$ Dimethoate 30 EC @ 300g a.i./ha | 34.10 | 5.33 | 84.37 | 2.76 | 91.91 | 1.70 | 95.01 | 1296.93 | 20.77 |
| $T_5$ Thiamethoxam 25 WG @ 25g a.i./ha | 34.66 | 2.50 | 92.78 | 1.60 | 95.38 | 0.23 | 99.33 | 1335.16 | 24.33 |
| $T_6$ Oxy-dematon methy l 25 EC @ 250g a.i./ha | 32.46 | 3.16 | 90.26 | 2.23 | 93.13 | 1.33 | 95.90 | 1310.96 | 22.07 |
| $T_7$ Control | 33.50 | 37.63 | _ | 35.33 | _ | 34.23 | _ | 1073.90 | _ |
| F- test | NS | Sig. | | Sig. | | Sig. | | Sig. | |
| CD at 5% | 3.32 | 1.02 | | 0.94 | | 0.55 | | 35.28 | |

NS= non significant Sig.= Significant DAS= Days after spray

| | Treatment | Amount of formulation (ha) | Cost of insecticide (Rupees /ha) | Labour charges including rent of equipment | Total cost (kg/ha) (kg/ha) | Yield in yield | Increase of protection (Rupees/ha) | Net return (Rupees /ha) | Cost benefit ratio |
|---|---|---|---|---|---|---|---|---|---|
| $T_1$ | Fipronil 5SC @ 50g a.i./ha | 1.00 Litre | 920.00 | 300 | 1220.00 | 1416.30 | 342.40 | 9929.6 | 8.14 |
| $T_2$ | Imidacloprid 17.8SL @ 20g a.i./ha | 0.1124 kg | 168.60 | 300 | 468.60 | 1373.56 | 299.66 | 8690.14 | 18.54 |
| $T_3$ | Acephate 75SP @ 350g a.i./ha | 0.4667 kg | 326.69 | 300 | 626.69 | 1309.23 | 235.33 | 6824.56 | 10.89 |
| $T_4$ | Dimethoate 30EC @ 300g a.i./ha | 1.000 litre | 350.00 | 300 | 650.00 | 1296.93 | 223.03 | 6467.87 | 9.95 |
| $T_5$ | Thiamethoxam 25WG @ 25g a.i./ha | 0.1000 kg | 130.00 | 300 | 420.00 | 1335.16 | 261.26 | 7576.54 | 17.62 |
| $T_6$ | Oxy-dematon methyl 25 EC @ 250g a.i./ha | 1.00 litre | 900.00 | 300 | 1200.00 | 1310.96 | 237.06 | 6874.74 | 5.73 |
| $T_7$ | Control | _ | _ | _ | _ | 1073.90 | _ | _ | _ |

Mustard rate @Rs.29/kg. Labour charge @Rs.200/day +@Rs.100/day.

minimum reduction (94.83 percent) of aphid population was recorded in fipronil 5SC treatment. Parmar and Kapadia (2007) also found Acephate 75 SP @ 350 g. a.i./ha and Imidacloprid 17.8 SL @ 20 gm a.i./ha most effective against mustard aphid. Singh and Verma (2008) also found acetamiprid, dimethoate and imidacloprid effective in reducing the aphid density.

On the basis of grain yield of mustard, the fipronil 5SC@50gm a.i./ha was found most effective with highest grain yield i.e. 1416.3 kg/ha. It was 31.88 per cent higher over the control plots. That was significantly higher than the rest of all insecticidal treatments followed by imidacloprid 17.8SL@ 20gm ai/ha thiomethoxam 25L@25gm ai/ha and oxy-dematon methyl with 27.90, 24.33 and 22.07 percent increase in yield over (1296.93 kg/ha ) control, while the lowest yield was recorded in dimethoate treated plots with only 20.77 percent increase over the untreated control (table 1). Rana *et al.(2008)* also recorded higher yield by using thiamethoxam and imidacloprid.

The highest cost benefit ratio was observed from imidacloprid 17.8SL@20g ai/ha (1:18.54) followed by thiamethoxam 25WG@25gm a.i./ha (1:17.62) and acephate 75SP@350gm a.i./ha (1:10.89). However oxy-dematon methyl 25EC @250gm ai/ha had the lowest cost benefit ratio (1:5.73).

On the basis of above findings the imidacloprid 17.8SL @20gm a.i./ha and thiomethoxom 25wg @25g a.i./ha are the most promising recommendations to effectively manage the *L. erysimi* in mustard crop with the higher net return than the rest of other insecticides.

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