Bio-efficacy of biopesticides and certain chemical insecticides against mustard aphid (*Lipaphis erysimi* Kalt.) on mustard crop under field condition

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**ABSTRACT**

The experiment was conducted on bio-efficacy of Biopesticides and certain chemical insecticides against mustard aphid (*Lipaphis erysimi* Kalt.) at research farm Department of Entomology, SHIATS Allahabad during Rabi season of 2012-2013. Bio-efficacy of Biopesticides and certain chemical insecticides against mustard aphid (*Lipaphis erysimi* Kalt.) on mustard revealed that treatments of Dimethoate 30 EC followed by spraying of Malathion 50 EC and Neem oil (0.5%) were found more effective for control of *Lipaphis erysimi* Kalt., respectively. Whereas, the descending order of treatments were Neem oil > NSKE > Tobacco Leaf extract > Bacillus thuringiensis > Beauveria bassiana > Metarhizium anisopliae. The least effective treatment was *Verticillium lecanii*. Maximum infestation was recorded in control.

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**KEY WORDS:** Aphid, Biopesticides, Dimethoate, *Lipaphis erysimi* Kalt., Malathion, Neem oil

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**INTRODUCTION**

Rapeseed and mustard are one of the most important oilseed crop of India belong to genus *Brassica* of family *cruciferae*. Rapeseed or mustard oil is the most important edible oil in north India which is difficult to be replaced by any other oils. The oil content of most of the types ranges between 30-48 per cent; however, in white mustard it is hardly 25-33 per cent. Mustard seed oil has a specific gravity of 0.90 with iodine value ranging from 87 to 122. Saponification value varies between 170 and 200 (Nagaraj, 1995). Composition of Brassica oil- oil 31-44 per cent, cake protein 37-44 per cent, ash in cake 5-9 per cent, iodine value 74-98, refractive index 1.4612 to 1.4662. Oldest use of rapeseed oil was as a lamp oil. The oil is also used as medicinal remeais to cure stomach problems and skin diseases. Now the oil is used mainly for industrial and edible purposes (Reddy, 2009). The estimated area, production and yield of rapeseed-mustard in the world was 34.19 million hectares (m ha), 63.09 million tonnes (mt) and 1,850 kg / ha, respectively, during 2012-13 (http://www.dacnet.nic.in). There are at least
38 insect associated with *Brassica* crop. Dimond back moth, saw fly and aphids are the major pest on *Brassica*. Yield losses due to these pest range from 20-70 per cent (Reddy, 2009). The mustard aphid, *Lipaphis erysimi* (Kalt.) is a serious pest of mustard in India and other tropical regions in the world. Aphids remain active in North India on rapeseed mustard crop from November-March with higher population during mid February to mid March. Mustard aphid cause 65 to 96 per cent loss in seed yield (Bakhetia, 1984) and loss in oil content up to 15 per cent. Research workers have started searching out the effective environmentally safe eco-friendly and bio-intensive control measures which may keep the crop pest suppressed below economic threshold level (ETL). Different control measure is recommended to control this pest among which chemical control is the most important. The chemical insecticides have been found more or less toxic to a number of Parasitoids and Predators (Singh *et al*., 2007). The bio-agents are more compatible with the environmental components, eco-friendly with plant health and non-hazardous to human being (Singh and Lal, 2012) The present investigation was undertaken to evaluate the comparative bio-efficacy of biopesticides and certain chemical insecticides against mustard aphid (*Lipaphis erysimi* Kalt.) on mustard crop under field condition.

**MATERIAL AND METHODS**

To determine the “Bio-efficacy of biopesticides and certain chemical insecticides against mustard aphid (*Lipaphis erysimi* Kalt.) on mustard crop under field condition” was carried out at the Agriculture research farm, Department of Entomology, SHIATS, Allahabad during Rabi season 2012-13. The cultivar Varuna (T59) was sown in simple R.B.D. with ten treatments, replication thrice in the plot size 4m×4m having line to line and plant to plant spacing as 50 cm and 10 cm, respectively. The spraying of treatment was done with the help of knapsack sprayer. Total two sprays were applied to protect crop from aphid (*Lipaphis erysimi* Kalt.) infestation. Sprays of insecticides were carried out at an interval of 15 days. The treatments were Neem oil, NSKE, Tobacco Leaf extract, *Beauveria bassiana*, *Metarhizium anisopliae*, *Verticillium lecanii*, *Bacillus thuringiensis*, Dimethoate 30 EC, Malathion 50 EC, and untreated control. The per cent infestation of aphid population was recorded one day before and after 1st,

<table>
<thead>
<tr>
<th>Table 1: Bio-efficacy of biopesticides and certain chemical insecticides against mustard aphid (<em>Lipaphis erysimi</em> Kalt.) on mustard crop during Rabi 2012-2013</th>
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</thead>
<tbody>
<tr>
<td><strong>Treatments</strong></td>
</tr>
<tr>
<td>Neem Oil 5%</td>
</tr>
<tr>
<td>NSKE 5%</td>
</tr>
<tr>
<td>Tobacco Leaf extract 4%</td>
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<tr>
<td><em>Beauveria bassiana</em></td>
</tr>
<tr>
<td><em>Metarhizium anisopliae</em> 1x10^10 spore/ml</td>
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<tr>
<td><em>Verticillium lecanii</em> 1x10^9 spore/ml</td>
</tr>
<tr>
<td><em>Bacillus thuringiensis</em> 1x10^9 spore/ml</td>
</tr>
<tr>
<td>Dimethoate 30 EC</td>
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<td>Malathion 50 EC</td>
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<td>Control (water spray)</td>
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</tbody>
</table>

**Note**: DBS: Day before spray, DAS: Day after spray

**Abbreviation**: C.D.: Critical Difference, D: Day before treatment, E.P.: Effective Percent, F: Test, N.S.: Non significant
3rd, 7th and 10th days of the spray. The observation was taken on the 10 cm central twig of 10 randomly selected tagged plants per plot. To compare the effectiveness of biopesticides and chemical insecticides was also run simultaneously by statistical analysis.

RESULTS AND DISCUSSION

Overall mean per cent population infestation after two spray during 2012 is presented in Table 1. The statistically analysis of data on per cent population infestation of aphid (Lipaphis erysimi Kalt.) over control on Over all mean after spraying revealed that all the treatments were significantly superior over control. The data revealed that Dimethoate 30 Ec and Malathion 50 Ec were found highly effective for control of Lipaphis erysimi Kalt. they registered 38.17 and 42.03 minimum infestation of aphid per plant, respectively. They were followed by the Neem oil (5ml/l), NSKE (50g/l), Tobacco leaf extracts (10ml/lit.) and Bacillus thuringiensis (2g/l lit.) they registered 48.72, 51.44, 56.03 and 64.62 aphid infestation per plant, respectively. Other treatments were effective Beauveria bassiana (67.46), Metarhizium anisopliae (70.15) and least effective treatment Verticillium lecanii (71.03). Maximum infestation was recorded in control (89.70). From above results are accordance with consideration of Men et al. (2002) who reported that spray of Dimethoate was effectively controlled Lipaphis erysimi and also similar results obtained by Gour and Pareek (2003) and Reza et al. (2004) reported that highest mean aphid mortality during the first spraying. Bana et al. (2011) also concluded that Malathion as one of the best effective treatment. The other authors, whose findings are similar with the present investigation, are Menna et al. (2003), Gupta and Rai (2006) also reported that among botanicals, neem product was found to be effective in comparison to other indigenous materials. Rai and Singh (2008) concluded that, for the management of mustard aphid NSKE 5 per cent should be recommended which is safe, eco-friendly botanical. Saranya et al. (2010) reported that Among the five entomopathogenic fungi, V. lecanii, H. thompsonii and B. bassiana were found to be the promising virulent isolates for controlling aphid population. The other findings similar with the present are, Jeong Jun et al. (2011); Kaur et al. (2012); Suresh et al. (2012) and Al-Alawi and Obeidat (2014).

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