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# Effect of bio pesticides and novel insecticides on mustard crop for natural bio agent, coccinellids population in Western U. P.

**Pinkesh Ahlawat, Rajendra Singh, Devendra Kumar, Joginder Singh, Mahendra Singh, Ritesh Sharma and Anant Kumar**

**Abstract**
The field experiment was carried out during *Rabi* 2015-16 at Crop Research Centre (C.R.C), Chirauri Farm, Sardar Vallabhbhai Patel University of Agriculture & Technology., Meerut (U.P.) India. The study effect of various insecticides on coccinellid population showed that imidacloprid 17.8% SL @ 150 ml/ha was found safer followed by thiamethoxam 25% WDG @100 g/ha. From the present study it may be concluded that the seasonal incidence of *L. erysimi* was influenced by one or more abiotic factors and crop stage. These newer insecticides not only effective in reducing the population of aphids but also proved safer to natural enemies (coccinellid) population and help to maintain the ecosystem.

**Keywords:** Coccinellid population, various insecticides

## Introduction
Mustard, (*Brassica juncea* Linnaeus), belongs to family cruciferae so that oilseed crops play an important role in agricultural economy of India. It constitutes the second largest agricultural product in the country next to food grains. India holds first position as a grower, producer, importer and exporter of vegetable oils in the world scenario, source of edible oil and vegetable for human as well as cakes for animals. Aurvedic Samhitas describes the use of 'Sarson' in India. In Sanskrit literature, 'Sorson' seeds have been described as antiseptic (Das, 1997) [4]. Rapeseed-mustard (*Brassica* spp.) are the major *Rabi* oilseed crops, grown over an area of 6.34 million hectare with a production of 7.82 million tones and productivity of 1234 kg/ha in 2012-13 in India (Thomas *et al*., 2014). Rajasthan is the largest mustard seed producing state in India accounting for over 45 per cent share in Indian mustard seed production followed by UP (15 per cent), M.P. (11 per cent). It also account for over 40 per cent of acreage. According to latest, data released from Department of Agriculture, Govt of Rajasthan, as on 2nd Nov, 2015, area under Rape & Mustard is pegged at 11.77 lakh hectares (lh) which is lower by 2.93 lh or 20 per cent lower compared to last years' sowing data. In 2015-16 *Rabi* season, Rajasthan has target to plant about 27 lakh hectares (lh) of Rape & Mustard. (Anonymous 2015-16) Several insect-pests attack and cause damage to these crops. About 38 insect species were reported to be associated with the *Brassica* oilseed crops (Bakhetia and Sekhon, 1989). Out of which, mustard aphid, *Lipaphis erysimi* (Kalt.) Mustard sawfly, *Athalia proxima* (Klug). Painted bug, *Bagrada hilaris* (Kirk). Leaf miner, *Chromatomyia horticola* (Goureau) and Bihar hairy caterpillar, *Spilarctia obliqua* (Walker) are the pests of major importance. Among these, *L. erysimi* is one of the most destructive insect (Rai, 1976) It causes damage directly by sucking phloem from different parts of plant and indirectly as a vector of plant viruses. The attack is severe in those regions where the numbers of cloudy days are more during the pest activity period. On heavy infestation, aphids are largely congregated underside of leaves, they curling and yellowing them and plants fail to develop pods, if young pods develop do not produce healthy seeds and also resulting plant to loss their growth (Mamun *et al*., 2010) [6]. The yield loss in rapeseed-mustard also varies with their germplasms and agro-ecological practices (Ansari *et al*., 2007) [3]. However, the excessive use of the chemical insecticides is not desirable because of its residual effects on the food chains. Hence, there is a need for continuous evaluation of chemicals against pest and safety to the non target species. Now a day's many new emerging chemicals are available in the market with good efficacy for pest control and safety to non target organism. Therefore, it is necessary to test the efficacy of such new chemicals at specific time which fit well in pest management programme. Keeping these points in view, the present study was undertaken to the "effect of bio pesticides and novel insecticides on natural bio agent, coccinellids population".

**Materials and Methods**

The present investigation on effect of bio pesticides and novel insecticides on natural bio agent, coccinellids population in western U.P." was carried out from *Rabi* 2015-16 in order to explore better developing coccinellids population for management mustard aphid. The details field experiment was carried out during *Rabi* 2015-16 at Crop Research Centre (C.R.C), Chirauri Farm, Sardar Vallabhbhai Patel University of Agriculture & Technology., Meerut (U.P.) India.

**Estimation of mustard aphid population**

To record the aphid population, ten plants were randomly selected and tagged. The aphid population was recorded on these selected plants, starting with the appearance of the aphids till the harvesting of the crop. The observation for recorded on 4th January, 2015 and other observation were recorded at weekly intervals. The observation for recording the coccinellids population was confined to only top 10 cm of the central shoot on each plant. Further, 5 Plants from each row were selected to record the average height of the plant, average number of branches per plant and pod size of each tested variety.

**Effect of bio pesticides and novel insecticides on Coccinellids Population**

The Coccinellids are an important natural enemy of mustard aphid (*Lipaphis erysimi*) abundantly found in mustard fields. The data on cocinellids population per shoot was recorded on five randomly selected plants one day before and 1, 3, 7 and 14 days after each insecticide application.

**Harvesting and threshing**

Harvesting of the crop was carried out early in the morning when 75-85 percent siliquae have turned golden colour. After that bundles were kept in sun for 7-8 days. Threshing was done and seeds are separated by winnowing.

**Yield of mustard seeds**

Seed yield of mustard was taken on the basis of individual plot and expressed in kg/plot$^{-1}$ and converted into q/ha$^{-1}$.

**Statistical analysis of the coccinellids population**

The data recorded during the course of investigation were subjected to statistical analysis by using analysis of variance technique (ANOVA) for randomized block design as suggested by Panse and Sukhatme (1978). The data were transformed necessarily as and when required. Standard error of mean in each case and the critical difference only for significant cases were computed at 5% level of probability.

**Result**

**Effect of bio pesticides and novel insecticides on predatory Coccinellids population**

**First application**

Pre treatment observations recorded one day before first application indicated that the population of predatory coccinellids beetles ranged from 3.00 to 3.67 beetles /5 shoots and did not differ significantly (Table 1& 2 Figure: 1&2). Data recorded on 1st, 3rd, 7th, 14th days after first spraying, the maximum beetle population 6.7, 8.15 8.67, 10.30 beetles/5 shoots, respectively were noticed with imidacloprid 17.8 %SL @ 20 ml a.i/ha and found safer than other treatments. It was followed by dimethoate 30 %EC @ 300 ml a.i/ha in which 5.8, 7.3, 5.33, 6.00 beetles/5 shoots were noticed on 1st, 3rd, 7th, 14th day after spraying, respectively. Next to thiamethoxam 25 % WDG @ 25 g a. i ha,, the maximum number of predatory coccinellids on 1st, 3rd, 7th, 14th days 4.8, 6.1, 6.00, 7.67 is followed by acephate 75 %SP @ 350g a.i/ha, (3.7, 5.35, 5.33, 6.00 beetles), which was closely followed by fipronil 5 % SC @ 50 ml a.i/ha, (3.56, 4.56, 4.67, 5.67 beetles). Neem seed extract (NSE) @ 5% (3.30, 4.25, 4.00, 4.33 beetles) proved toxic after first spray. Minimum beetle population (3.45, 4.45, 3.33, 4.0 beetles/5 shoots) was recorded in the treatment Neem oil 1500 ppm @ 3.0 lit/ha and found highly toxic to beetle population. Second application A similar trend of observations on beetle population was recorded after second spray as recorded in first spray (Table 10 and Figure 8). The maximum beetle population i.e. 5.67, 5.00, 5.67, 6.00, 6.33 beetles/5 shoots were recorded on 1st, 3rd, 7th, and 14th, day after second application, respectively with the treatment imidacloprid 17.8 %SL @ 20 ml a.i/ha and it again proved safe than other treatments. The next safe treatment was dimethoate 30 %EC @ 300 ml a.i/ha, in which 4.33, 4.33, 4.67, 5.00, and 5.67 beetles/5 shoots were recorded on 1st, 3rd, 5th, 7th, and 14th day after spraying Thiamethoxam 25 % WDG @ 25 g a. i ha, (4.33, 4.00, 4.67, 5.00, 5.33), respectively and it was followed by acephate 75 %SP @ 350g a.i/ha(4.33, 3.67, 4.33, 4.33, 5.00), fipronil 5 % SC @ 50 ml a.i/ha(3.33, 3.33, 4.00, 3.67.3.67), Neem seed extract (NSE) @ 5% (3.00, 4.0, 3.67, 3.00, 4.303) and Neem oil 1500 ppm @ 3.0 lit/ha (2.33, 2.67, 3.00, 3.33, 4.00). In control plot 4.67, 10.33, 10.67, 11.33, 12.00, beetles/ 5 shoots was recorded on 1st, 3rd, 7th and 14th day after spraying, respectively. It is evident from the data that newer insecticides were found safer than conventional insecticides. The present findings are in conformity with Rajesh kantipudi (2013), and Dhaka *et al.* (2009), also reported that dimethoate and endosulfan adversely affect the population of predatory coccinellids. However, Sunitha *et al.* (2004) reported that imidacloprid was toxic than other insecticides to predatory coccinellids and several scient reported by several workers viz., Kantipudi Rajesh *et.al.*,(2013) was recorded effective in reducing aphid population in the present studies which is conformity with the findings of earlier studies conducted by Kantipudi Rajesh *et.al.*,(2013) was also found effective in the present studies which is in agreement with the results

**Summery and conclusion**

The present investigation results obtained in the study are summarized and concluded. "Effect of bio pesticides and novel insecticides on predatory Coccinellids population observations of the recorded pre treatment of one day before first application of predatory coccinellids beetles ranged from 3.00 to 3.67 beetles /5 shoots and did not differ significantly on 1st, 3rd, 7th, 14th days after first spraying, the maximum beetle population 6.7, 8.15 8.67, 10.30 beetles/5 shoots, respectively were noticed with imidacloprid 17.8 %SL @ 20 ml a.i/ha and found safer than other treatments. The second application on beetle population was recorded after second spray the maximum beetle population i.e. 5.67, 5.00, 5.67, 6.00, 6.33 beetles/5 shoots were recorded on 1st, 3rd, 7th, and 14th, day after second application, respectively with the treatment imidacloprid 17.8 %SL @ 20 ml a.i/ha and it again proved safe than other treatments. It is evident from the data that newer insecticides were found safer than conventional insecticides. The present study it may be concluded that the seasonal incidence of *L. erysimi* was influenced by one or more abiotic factors and crop stage. For the control of *L. erysimi* newer insecticides were found more effective as compared to conventional insecticides and botanical

insecticide. These newer insecticides not only effective in reducing the population of aphids but also proved safer to natural enemies (coccinellid) population and help to maintain the ecosystem.

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