



ISSN (E): 2277-7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2023; SP-12(11): 639-641  
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[www.thepharmajournal.com](http://www.thepharmajournal.com)  
Received: 08-09-2023  
Accepted: 11-10-2023

**Diksha Garg**  
Indira Gandhi Krishi  
Vishwavidyalaya (IGKV),  
Raipur, Chhattisgarh, India

**BP Katlam**  
Indira Gandhi Krishi  
Vishwavidyalaya (IGKV),  
Raipur, Chhattisgarh, India

**Vikas Singh**  
Indira Gandhi Krishi  
Vishwavidyalaya (IGKV),  
Raipur, Chhattisgarh, India

## Bio efficacy of insecticide molecules against lac insect (*Kerria lacca*) predator *Pseudohypatopa pulvereana* Meyr

Diksha Garg, BP Katlam and Vikas Singh

### Abstract

Bio efficacy of different doses of Emamectin benzoate (0.001, 0.002 and 0.003 percent), Indoxacarb (0.001, 0.002 and 0.003 percent) and Rynaxypyr (0.001, 0.002 and 0.003 percent) were evaluated by dipping of brood lac in different insecticidal formulations for 5, 10 and 15 minute time period against the predator of lac insect *Pseudohypatopa pulvereana* Meyr in aghani lac crop in host plant *Flemingia semialata* at Dau Kalyan Singh Collage of Agriculture and Research Station, Bhatapara, Chhattisgarh during 2019. Overall impact of different doses of insecticides, Emamectin benzoate 0.003 at 15-minute time period was best insecticide with reduction percent of 91.38 for the management of lac insect *Kerria lacca* predator *Pseudohypatopa pulvereana* as compared to control. Treatment of broodlac in insecticidal formulations for 5, 10 and 15 min durations exerted significant reduction in the population of lepidopteron predator, *Pseudohypatopa pulvereana* Meyr.

**Keywords:** *Pseudohypatopa pulvereana* Meyr, emamectin benzoate, indoxacarb, Rynaxypyr

### Introduction

Lac is hard resinous, nontoxic, tasteless, biodegradable substance which is secreted by resin gland of lac insect, *Kerria lacca* (Kerr), which comes under order- Hemiptera, suborder- Homoptera, super family- Coccoidea and family-Tachardiidae.

Two strains of lac insect are Rangeeni and Kusmi. The crop cycle of kusmi lac insect is January-February to June-July (summer) and June-July to January-February (winter), known as jethwi and aghani crop, respectively (Singh *et al.*, 2018) [7].

Indigenous host plant for lac insect are Kusum (*Schleichera oleosa* Oken), Palas (*Butea monosperma* Taub) and Ber (*Ziziphus mauritiana* Lam) etc. These plant species take long time for establishment whereas bushy host plant *Flemingia semialata* Roxb. (Family: Fabaceae) found to be more suitable than other tree species and it can be utilized for lac cultivation after one year of planting.

Major two factors which are responsible for reduction in yield of lac crop *viz*: Biotic and abiotic factors. Biotic factor includes Predators and Parasitoids while abiotic factor includes weather factors. Predators are main factor that affect lac cultivation.

### Methods and Materials

Field experimentation was carried out at Rajadhar industrial farm, Dau Kalyan Singh Collage of Agriculture and Research Station, Bhatapara, Chhattisgarh during 2019. This site is located at 21° 7 N latitude and 81° 93 E longitude and is at an elevation of 261 m above mean sea level (MSL). The harvested broodlac was treated by dipping in different insecticidal formulations for 5, 10 and 15 minute time period and the kusmi broodlac were inoculated in *Flemingia semialata* plant during July.

The different doses insecticides Emamectin Benzoate 5% SG @ (0.001, 0.002% and 0.003%), Indoxacarb 14.7% SC @ (0.001, 0.002% and 0.003%) and Rynaxypyr 20% SC @ (0.001, 0.002 and 0.003% a.i. equivalent to a quantity ranging from 0.2 to 0.15 g or ml/L with check insecticide Ethefenprox 10% EC @ 0.02% as check and water as control.

The bio-efficacy potential was assessed on the basis of reduction in population of insect predator *Pseudohypatopa pulvereana* Meyr from treated broodlac. There were 11 treatments including check and control with three replications for kusmi. Randomly selected broodlac weighing 25 g each bundle was treated and assessed for safety on lac insect as reported by Jaiswal *et al* (2017) [8]. The bags containing kusmi broodlac were inoculated on plants of *Flemingia semialata* plant.

**Corresponding Author:**  
**Diksha Garg**  
Indira Gandhi Krishi  
Vishwavidyalaya (IGKV),  
Raipur, Chhattisgarh, India

The quantification of living and dead lac insect was carried out 30 days after inoculation (DAI) The 60 mesh net bags used as broodlac container were removed from host plant and it was kept in the laboratory under well aerated condition. These bags were opened after two months of treatment and number of adult lepidopteron predator emerged from treated broodlac were quantified. Percent reduction in emergence over control was calculated for each treatment to assess the bio- efficacy potential of different insecticide on predator (*Pseudohypatopa pulverea* Meyr) of lac insect. Statistical analysis was carried out using standard analysis of variance (ANOVA) in randomized block design. Treatment means were compared at  $p < 0.05$  level of significance.

### Results and Discussion

The bio-efficacy of various doses of Emamectin benzoate, Indoxacarb and Rynaxypyr was studied to check efficacy of insecticides against predators of lac insect and lac insect survival. The kusmi broodlac was treated by dipping in different insecticidal formulations of "Emamectin benzoate" (0.001, 0.002, and 0.003 percent), Indoxacarb (0.001, 0.002 and 0.003 percent) and Rynaxypyr (0.001, 0.002 and 0.003 percent) for 5, 10 and 15-minute time period. Are presented in table no.1 Ethefenprox was taken as check insecticide during the preset investigation.

The broodlac was treated for 5-minute time period and inoculated in semialata plant there after incidence of *Pseudohypatopa pulverea* Meyr was recorded which are presented in table1. Found that all concentrations of insecticides were found quite against the *P. pulverea* Meyr in comparison of control.

In the entire treatments minimum *Pseudohypatopa pulverea* Meyr incidence was noticed in Emamectin benzoate @ 0.003 percent having minimum population of 1.00 followed by Emamectin benzoate @ 0.002 percent having minimum population 1.66 in with reduction percent of 73.77 which was at par with Indoxacarb @ 0.003 percent. Thus showed, its significance from rest of the doses of insecticides. Other treatments were less effective but found superior as compared to control. Population reduction of *Pseudohypatopa pulverea* Meyr was noticed 84.20 percent in Emamectin benzoate @ 0.003 percent over control. Rest of the insecticides showed least effective with the population varied from 2.00 to 2.66 as compared to control which was recorded mean *Pseudohypatopa pulverea* Meyr population of 6.33 numbers and percent reduction over control with tune of range between 45.42 to 72.71 percent.

Broodlac was treated with 10-minute time period and inoculated in semialata plant after that *Pseudohypatopa pulverea* Meyr incidence was recorded. All concentrations of insecticides were found effective against the *P. pulverea* Meyr in comparison of untreated crop.

In the entire treatments minimum *Pseudohypatopa pulverea* Meyr incidence was recorded in Emamectin benzoate @ 0.003 percent having minimum population of 0.66 followed by Emamectin benzoate @ 0.002 percent having population of 1.66 with percent reduction of 77.35 which was at par with Indoxacarb @ 0.003 percent during the aghani crop 2018. This differed significantly from the rest of the doses of insecticides. Other treatments were less effective but found superior as compared to control. Population reduction of *Pseudohypatopa pulverea* Meyr was noticed 90.99 percent in Emamectin benzoate @ 0.003 percent over control. Rest of the insecticides showed least effective with the population varied from 2.00 to 2.66 as compared to control which was recorded mean *Pseudohypatopa pulverea* Meyr population of 7.33 numbers and percent reduction over control ranged from 63.71 to 72.71.

Then broodlac was treated for 15-minute time period and inoculated in semialata plant after that *Pseudohypatopa pulverea* Meyr incidence was noticed and found different doses of insecticides were effective against the *P. pulverea* as compared to the untreated crop.

Regarding, minimum *Pseudohypatopa pulverea* Meyr incidence was noticed in Emamectin benzoate @ 0.003 percent having minimum population of 0.66 followed by Emamectin benzoate @ 0.002 percent having population of 1.33 with reduction percent of 82.63 which was at par with Indoxacarb @ 0.003 percent during the aghani crop 2018. Thus showed its importance from the rest of the doses of insecticides. Other treatments were less effective but found superior as compared to control. Reduction of population of *Pseudohypatopa pulverea* Meyr was noticed the tune of 91.38 percent in Emamectin benzoate @ 0.003 percent over control. Rest of the insecticides showed least effective with the population varied from 1.33 to 2.33 as compared to control which was recorded mean *Pseudohypatopa pulverea* Meyr population of numbers 7.66 and percent reduction over control with tune of range from 69.58 to 78.32 percent.

Among the treatments the best group for reducing the incidence of *Pseudohypatopa pulverea* Meyr was found to be Emamectin benzoate @ 0.003 percent followed by which was at par with be Emamectin benzoate @ 0.002 and Indoxacarb @ 0.003 percent which was reduced over control with tune of 82.63 and 91.38 percent respectively. Thus showed its significance from the rest of the insecticides which received reduction percent tune varied from 69.58 to 78.32 Check insecticide showed the population of 2.00 with the reduction percent of 73.89 percent.

Present investigation agreed with the finding of Jaiswal *et al.*, (2017) [8] that Emamectin benzoate 0.003 was best insecticide at 15-minute time period with reduction percent of 91.38 for the management of lac insect *Kerria lacca* predator *Pseudohypatopa pulverea* Meyr as compared to control.

**Table 1:** Effect of different concentration of insecticide on predator *Pseudohypatopa pulverea* of lac insect *Kerria lacca*

Population of <i>Pseudohypatopa pulverea</i> at								
Treatments	Insecticide	Conc.	5 minute dipping	% Reduction Over control	10 minute dipping	% Reduction over control	15 minute dipping	% Reduction over control
T <sub>1</sub>	Emamectin benzoate 5%SG	0.001%	2.33 (1.82)	63.19	2.00 (1.73)	72.71	1.66 (1.62)	78.32
T <sub>2</sub>	Emamectin benzoate 5%SG	0.002%	1.66 (1.74)	73.77	1.66 (1.62)	77.35	1.33 (1.59)	82.63
T <sub>3</sub>	Emamectin benzoate 5%SG	0.003%	1.00 (1.59)	84.20	0.66 (1.59)	90.99	0.66 (1.45)	91.38
T <sub>4</sub>	Indoxacarb 14.7%SC	0.001%	2.66 (1.41)	57.97	2.33 (1.23)	68.21	2.33 (1.23)	69.58
T <sub>5</sub>	Indoxacarb 14.7%SC	0.002%	2.00 (1.91)	68.40	2.00 (1.82)	73.89	2.00 (1.82)	73.89
T <sub>6</sub>	Indoxacarb 14.7%SC	0.003%	1.66 (1.88)	73.77	1.66 (1.76)	77.35	1.33 (1.74)	82.63
T <sub>7</sub>	Rynaxypyr 20.0%SC	0.001%	3.00 (1.62)	52.60	2.66 (1.73)	63.71	2.33 (1.73)	69.58
T <sub>8</sub>	Rynaxypyr 20.0%SC	0.002%	2.66 (1.59)	57.97	2.33 (1.74)	68.21	2.33 (1.45)	69.58
T <sub>9</sub>	Rynaxypyr 20.0%SC	0.003%	2.00 (2.0)	68.40	2.33 (1.82)	69.58	2.00 (1.82)	75.99
T <sub>10</sub>	Ethefenprox10%SC (Check)	0.20%	2.33 (1.91)	68.21	2.00 (1.74)	72.71	2.00 (1.85)	73.89
T <sub>11</sub>	Control (water)	-	6.33 (1.88)	0.00	7.33 (1.94)	0.00	7.66 (1.76)	0.00
	CD		0.28		0.28		0.26	
	CV		9.51		9.38		9.44	
	SEm±		0.09		0.09		0.08	

### Conclusion

The bio-efficacy of various doses of Emamectin benzoate, Indoxacarb and Rynaxypyr was studied to check efficacy of insecticides against predator of lac insect and lac insect survival.

The kusmi broodlac was treated by dipping in different insecticidal formulations of "Emamectin benzoate" (0.001, 0.002, and 0.003 percent), Indoxacarb (0.001, 0.002 and 0.003 percent) and Rynaxypyr (0.001, 0.002 and 0.003 percent) for 5, 10 and 15-minute time period are presented in table no. 1 Ethefenprox was taken as check insecticide during the preset investigation.

Among the treatments the best group for reducing the incidence of *Pseudohypatopa pulverea* Meyr was found to be Emamectin benzoate @ 0.003 percent followed by which was at par with Indoxacarb @ 0.003 percent which was reduced over control with tune of 87.99 and 91.38 percent respectively. Thus showed its significance from the rest of the insecticides which received reduction percent tune varied from 69.58 to 78.32 Check insecticide showed the population of 2.00 with the reduction percent of 73.89 percent.

### Acknowledgement

I grateful express my gratitude and thanks to my major guide Dr. B.P. Katlam, Senior Scientist, Department of Entomology, Indira Gandhi agriculture university (IGKV), for his most valuable and inspiring guidance. A Special thanks to Vikas singh, COA Raipur and Y.K. Meshram, COA and Research Station Janjgir-Champa for their technical help, affectionate encouragement and useful suggestions during of tenure of this investigation.

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