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Research Article

EFFICACY OF CHEMICAL INSECTICIDES AGAINST BIHAR HAIRY CATERPILLAR *SPILOSOMA OBLIQUA* WALKER (LEPIDOPTERA: ARCTIIDAE), UNDER LABORATORY CONDITION

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Abstract: The present experiment was conducted in the laboratory of Department of Entomology, College of Agriculture, Gwalior (M.P.) during Kharif season in the year 2019-20. Five different insecticides and one control were selected for the experiment to test their efficacy against Bihar hairy caterpillar *Spilosoma oblique* Walker. The experiment was carried out in completely randomized block design (CRD). All the treatments were replicated four times. Observations were recorded 12, 24 and 48 hrs after insecticides application. The sample consisted of 24 caterpillars of *S. obliqua* per replication. Emamectin benzoate 5% SG @ 0.44 gm/lit. showed the best results after 12, 24 and 48 hours after application. All the treatments were found superior over control.

Keywords: *Bihar hairy caterpillar, Spilosoma obliqua, insecticide, Emamectin benzoate*

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Introduction

Bihar hairy caterpillar *Spilosoma oblique* Walker (Lepidoptera: Arctiidae) is a polyphagous and sporadic pest attacking nearly 126 plants species distributed in 24 families [1]. This pest has been reported to cause extensive damage to crops such as oilseeds, pulses, vegetables, fodder, fiber crops, and fruit trees. The larvae are voracious feeder and its population often reaches epidemic level when they defoliate plants and move from field to field finishing the vegetation of the area of their visit. It is a serious pest of sesame and other crops in West Bengal, Bihar, Uttar Pradesh, Punjab, Madhya Pradesh, Manipur and some other states in India. They cause serious damage and significant reduction in yield of preferred crops including sesame [2].

Use of chemicals for pest control indeed has been proved useful for agriculture and chemical insecticides; and are often recommended to combat the infestation of these pests [3]. It is known fact that the Bihar hairy caterpillar showed certain levels of behavioral resistance to different class of insecticides [4]. Various insecticides belonging to different classes are being used for management of this pest all over the world. These insecticides are widely reported as good lepidoptericides but continuous and indiscriminate use of insecticides by the farmers has resulted in the development of resistance. We cannot deny the possibility for development of resistance. To overcome this problem, insecticide resistance must be continuously monitored and an integral part of chemical control should be formed to enable the detection of resistance and to take necessary measures against it [5].

Keeping these points in mind, the present study was conducted at Entomology Lab, College of Agriculture, Gwalior, to determine the efficacy of different insecticides against the larvae of *S. oblique* by leaf-dip method of application under laboratory conditions [6-14].

Material and Methods

The present investigation was conducted in the laboratory of Department of Entomology, College of Agriculture, Gwalior, M.P. five insecticide namely Thiacloprid 21.7% SC (Alanto), Chlorantranilliprole 18.5 SC (coragen), Emamectin benzoate 5% SG (Amnon), Flubendlamide 39.35% m/m SC (Fame), Chlorpyriphas 20% EC(Tagban) with untreated control were tested again Bihar hairy caterpillar in laboratory condition replicated four time during kharif 2019-20. The experiment was carried out in Completely Randomized Design (CRD).

Treatment Details

Tr.No.	Treatments	Concentration
T_1	Thiacloprid 21.7% SC (Alanto)	1.5 ml/lit.
T_2	Chlorantranilliprole 18.5 SC (coragen)	0.3 ml/lit.
T_3	Emamectin benzoate 5% SG (Amnon)	0.44 gm/lit.
T_4	Flubendlamide 39.35% m/m SC (Fame)	1 ml/lit.
T_5	Chlorpyriphas 20% EC (Tagban)	2 ml/lit.
T_6	Control	

Method of observation

Lab experiment conducted during 2019-20 in the laboratory, Department of Entomology, College of Agriculture, Gwalior. First instar larvae of *S.obliqua* was collected from the Research Farm, COA, Gwalior, Madhya Pradesh and kept in plastic plate containing fresh and soft caster leaves. The petiole was wrapped with a wet piece of cotton swab to protect it from drying. Fresh food was supplied daily and proper hygienic conditions were maintained.

The experiment was conducted with five insecticides and one control against old larvae of *S. obliqua* by leaf dip method was followed as given by Kodandaram and Dhingra, (2007) under laboratory conditions at 27 ± 2°C temperature and 70± 5 percent relative humidity with five concentrations each prepared in tap water.

In order to test toxicity of insecticides, fresh full-grown matured caster leaves were plucked and brought to the laboratory. After proper washing, leaves were dipped in the required different concentrations of insecticides. Excess liquid was shaken from the foliage. This was then allowed to dry at room temperature. The treated leaves were transferred to clean Petri-plate. In each plate, four larvae were placed and each treatment was replicated four times. In control, the leaves were dipped in distilled water alone. The observations were recorded on mortality at 12, 24, and 48 hours after exposure (HAE).

Table-1 *Effect of different insecticides on S. oblique (Walker)*

Tr. No	Treatment	Dose ml/litre	12 hrs	24 hrs	48 hrs
T_1	Thiacloprid 21.7% SC (Alanto)	1.5	0.00(0.00)*	31.25(33.73)*	75.00(63.73)*
T_2	Chlorantranilliprole 18.5%SC (Coragen)	0.3	18.75(22.49)*	68.75(56.22)*	87.50(74.98)*
T_3	Emamectin benzoate 5% SG (Amnon)	0.44 gm/lit.	81.25(67.48)*	93.75(82.49)*	93.75(82.49)*
T_4	Flubendlamide 39.35% SC (Fame 480 SC)	1	12.50(14.99)*	56.25(48.73)*	81.25(67.48)*
T_5	Chlorpyriphos 20% EC (Tagban -20)	2	0.00(0.00)*	62.50(52.47)*	81.25(71.23)*
T_6	Control	-	0.00(0.00)*	0.00(0.00)*	0.00(0.00)*
	SE.m. ±		5.59	5.08	8.2
	C.D. at 5 %		16.74	15.2	24.56

*Sample size: 24 caterpillar /replication, Design: CRD, Replications:4, *Figures in parentheses are angular transformations*

Result

The results confirm that after 12 hours of application, T3, Emamectin benzoate 5% SG (81.25 %) showed significantly superior results followed by to T2, Chlorantranilliprole 18.5% SC (18.75) while T2 and T4 were at par. Remaining insecticides did not kill the larva but they stopped feeding after the application of the insecticides.

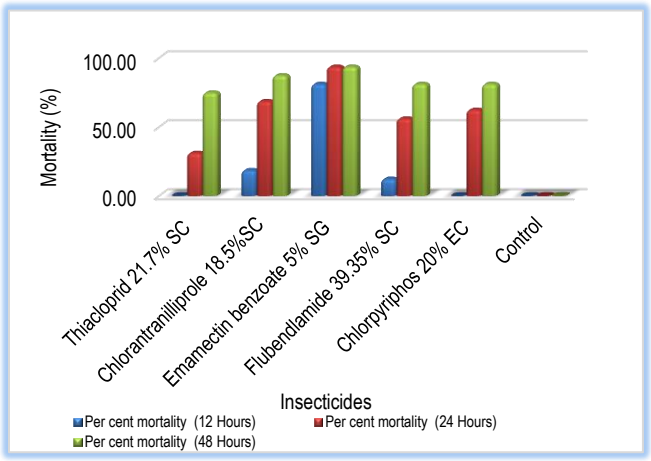

Fig-1 Efficacy of insecticides against *Spilosoma oblique*

It is also evident from the table that At 24 hrs after insecticide application, significantly maximum mortality of *S.oblique* was recorded in Emamectin benzoate 5% SG (93.75 %) followed by Chlorantranilliprole 18.5% SC (68.75 %) which was found at par with Chlorpyriphos 20% EC (62.50 %) and Flubendlamide 39.35% SC (56.25 %). Minimum mortality of *S.oblique* was recorded in Thiacloprid 21.7% SC (31.25 %).

At 48 hrs after insecticide application, all the insecticides significantly reduced the population of *S.oblique* compared to untreated control. Maximum mortality of *S.oblique* was recorded in Emamectin benzoate 5% SG (93.75 %) followed by Chlorantranilliprole 18.5%SC (87.50 %), Chlorpyriphos 20% EC (81.25 %) and Flubendlamide 39.35% SC (81.25 %). Minimum mortality of *S. oblique* was recorded in Thiacloprid 21.7% SC (75.00 %).

Conclusion

It may be concluded from the present investigation that Emamectin benzoate 5% SG @ 0.44 gm/lit was the more effective in controlling *S.oblique* as compared to other insecticides *viz*., Chlorantranilliprole18.5%SC, Chlorpyriphos20% EC and Flubendlamide 39.35% SC after 12, 24 and 48 hours after application.

Application of research: Study of chemical insecticides against Bihar hairy caterpillar *Spilosoma obliqua* Walker

Research Category: Agriculture Entomology

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Author Contributions: All authors equally contributed

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Study area / Sample Collection: Laboratory of Department of Entomology, College of Agriculture, Gwalior, M.P.

Cultivar / Variety / Breed name: Caster

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.
Ethical Committee Approval Number: Nil

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