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Bio-efficacy of modern insecticides against Bihar hairy caterpillar, *Spilosoma obliqua* (Walker) under laboratory condition

KL Painkra and Birjhu

Abstract
The present investigation was carried out in the laboratory of Department of Entomology, RMD College of Agriculture and Research Station, Ambikapur (C.G.) during *Kharif* 2019. Six different modern insecticides along with one untreated control were taken for the investigation to test their bio-efficacy against Bihar hairy caterpillar *Spilosoma oblique* (Walker). The experiment was carried out in completely randomized block design (CRD). All the treatments were replicated three times. Observations were recorded 12, 24 and 48 hours after application of insecticides. The sample consisted of 10 larvae of Bihar hairy caterpillar per replication. All the treatments were found superior over control. Maximum mortality percentage was recorded on Emamectin benzoate + Thiamethoxam 3.0%+12.0% WG (66.19%) which was superior, followed by Emamectin benzoate 5% SG (56.61%) and Cartap hydrochloride 50% SP (47.03%). Whereas, the least effective treatment was in Chlorfluazuron 5.4% EC recorded with (30.13%) minimum percentage of larval mortality.

Keywords: Bihar hairy caterpillar, *Spilosoma obliqua*, efficacy, insecticides

Introduction
Bihar hairy caterpillar, *Spilosoma obliqua* (Walker) is a polyphagous pest that comes under Lepidoptera order and Arctiidae family of class insecta consisting of chewing type of mouthpart which is confined to the oriental region known to cause severe damage to several crops of agricultural and horticultural importance. It feed on pulses, sesamum, linseed, cotton, jute, sorghum, soybean, groundnut, and some vegetables sweet potato, potato, radish, pumpkin, cowpea etc. Besides Nepal, this pest has also been reported in various other countries too such as India, Myanmar, Pakistan, China (Kabir and Khan, 1968; Singh and Seghal, 1992) [5, 7]. In India it is a serious pest of Bihar, Uttar Pradesh, Punjab, Madhya Pradesh, Chhattisgarh, Manipur and some other states.

It is a sporadic and polyphagous pest it has wide range of the host, the rate of larval survival and development vary greatly on different host plants. The adult female lays eggs in clusters on lower surface of the epidermis of the leaves in the crowded condition. During the early instars, the caterpillars feed gregariously on the green leaves behind the veins, soft tissues, and then disperse. In severe infestations, plants may be completely denuded (Adsule and Kadam, 1979; Gyawali, 1988; Srivastava, 1993) [1, 3, 8]. The third and onward instar larvae cause serious damages and significant reduction in yield, (Hussain and Begum, 1995; Gupta and Bhattacharya, 2008) [4, 2]. Use of chemicals for pest control indeed has been proved as boon for agriculture and chemical insecticides, and are often recommended to combat the infestation of these pests (Murugesan and Dhingra, 1995) [6]. Sometimes Bihar hairy caterpillar showed certain levels of behavioral resistance to different class of insecticides; hence successful control of this pest is to some extent difficult. Keeping this in view, studies were under taken to test the effectiveness of some modern insecticides against 3rd instars larvae of *S. obliqua*.

Material and Methods
The present investigation was conducted in the laboratory of Entomology, RMD College of Agriculture and Research Station, Ambikapur, Chhattisgarh. Seven treatments with untreated control were tested again Bihar hairy caterpillar and replicated three times during *Kharif* 2019. The experiment was carried out in Completely Randomized Design (CRD), details of the materials and methods of the study are presented below:-

Table 1: Treatment details

S. No.	Treatment details	Dose/liter of water
T_1	Emamectin benzoate 5% SG	0.5g
T_2	Chlorfluazuron 5.4% EC	1.0ml
T_3	Emamectin benzoate + Thiamethoxam 3.0%+12.0% WG	0.5g
T_4	Spinosad 45% SC	1.0ml
T_5	Cartap hydrochloride 50% SP	1.0g
T_6	Chlorantraniliprole 18.5% SC	1.0ml
T_7	Control	-

In order to research the impact of newer insecticides on Bihar hairy caterpillar, the 3rd instars larvae were collected from untreated field during the season. Half liters of spray solution of various insecticides have been prepared. The filter paper was dipped at the appropriate concentration of insecticide for one minute and allowed to dry under room temperature for one hour. The treated filter paper was stored in the Petri dish and then 10 larvae of Bihar hairy caterpillar were released. In parallel, no treated filter paper was held for comparison in the control treatment. The experiment was replicated three times. After the release of larva, observations were made on different hours and remove of dead larva from the treatments after each observation at hours. For the assessment of toxic effects, the mortality percentage of larvae was observed at 12, 24 and 48 hours after release of larva.

Table 2: Bio-efficacy of modern insecticides against Bihar hairy caterpillar, *Spilosoma obliqua* (Walker) under laboratory condition during *Kharif* 2019

Tr. No.	Treatment	Dose/lit.	Average larval mortality (%)			Over all mean
			12 HAT	24 HAT	48 HAT	
T_1	Emamectin benzoate 5% SG	0.5g	33.33 (35.20)	69.84 (56.68)	66.67 (59.99)	56.61
T_2	Chlorfluazuron 5.4% EC	1.0ml	13.33 (23.85)	23.61 (28.44)	53.45 (47.35)	30.13
T_3	Emamectin benzoate. + Thiamethoxam 3.0% + 12.0% WG	0.5g	36.67 (37.21)	73.02 (59.54)	88.89 (78.24)	66.19
T_4	Spinosad 45% SC	0.6ml	16.67 (23.85)	27.78 (31.74)	73.81 (59.42)	39.42
T_5	Cartap hydrochloride 50% SP	1.0g	20.00 (26.06)	25.26 (30.13)	95.83 (83.09)	47.03
T_6	Chlorantranilliprole 18.5% SC	0.5ml	16.67 (23.85)	32.41 (34.54)	60.95 (51.68)	36.68
T_7	Control	-	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00
	SE.m. ±	-	2.63	3.72	8.70	-
	C.D. at 5 %	-	8.05	11.40	26.66	-

Note: Figure in the parenthesis are angular transformation value, HAT = Hours after treatment

Results and discussion

The bio-efficacy of six various modern insecticides *viz.*, Emamectin benzoate 5% SG, Chlorfluazuron 5.4% EC, Emamectin benzoate + Thiamethoxam 3.0%+12.0% WG, Spinosad 45% SC, Cartap hydrochloride 50% SP and Chlorantraniliprole 18.5% SC along with untreated control were tested against the larvae of bihar hairy caterpillar during *Kharif* 2019-20.

12 Hours after treatment

The findings revealed that the highest (36.67%) mortality was obtained for Emamectin benzoate + Thiamethoxam 3.0% + 12.0% WG after 12 hours after treatment of insecticide use, followed by Emamectin benzoate 5% SG (33.33%). The next best treatment was Cartap hydrochloride 50% SP which was moderately effective (20.00%). However, the lowest mortality percentage was recorded for Chlorfluazuron 5.4% EC (13.33%).

24 Hours after treatment

It is also evident from the Table 2 that 24 hours after treatment, significantly maximum mortality of *S. obliqua* was recorded in Emamectin benzoate + Thiamethoxam 3.0%+12.0% WG (73.02%) followed by Emamectin benzoate 5%SG (69.84%). The next level best treatment was Chlorantranilliprole 18.5% SC (32.41= %) which was found at par with Spinosad 45% SC (27.78 %). Minimum mortality (23.61%) was recorded in Chlorfluazuron 5.4% EC.

48 Hours after treatment

At 48 hours after treatment, all the insecticides significantly reduced the populations of *S. obliqua* compared to untreated control. Maximum mortality (95.83%) was recorded in Cartap hydrochloride 50% SP followed by Emamectin benzoate + Thiamethoxam 3.0%+12.0% WG (with 88.89% larval mortality). Spinosad 45% SC and Emamectin benzoate 5% SG were the next level best treatment with (73.81%) and (66.67%) larval mortality, respectively. Minimum mortality (53.45%) was recorded in Chlorfluazuron 5.4% EC.

Overall mean larval mortality percentage

Results showed that among the different treatments, the maximum mortality percentage was recorded on by Emamectin benzoate + Thiamethoxam 3.0%+12.0% WG (66.19%), followed by Emamectin benzoate 5% SG (56.61%) and Cartap hydrochloride 50% SP (47.03%). Spinosad 45% SC and Chlorantranilliprole 18.5% SC were recorded the next active treatment with 39.42% and 36.68% larval mortality respectively. Whereas, the least effective treatment was in Chlorfluazuron 5.4% EC recorded with (30.13%) minimum percentage of larval mortality.

The order of bio-efficacy of modern insecticides for 3rd instars of bihar hairy caterpillar were Emamectin benzoate + Thiamethoxam > Emamectin benzoate > Cartap hydrochloride > Spinosad > Chlorantranilliprole > Chlorfluazuron.

The current findings partially supported with the work of Suryawanshi *et al.* (2020) [9] who reported Emamectin benzoate 5% SG showed the best results after 12, 24 and 48 hours after application of insecticides as compared to other insecticides *viz.*, Chlorantranilliprole 18.5% SC, Chlorpyriphos 20% EC and Flubendlamide 39.35% SC. However, current finding showed Emamectin benzoate + Thiamethoxam 3.0%+12.0% WG was the best treatment followed by Emamectin benzoate 5% SG in term of maximum mortality percentage of Bihar hairy caterpillar

Conclusion

It may be concluded from the present investigation that Emamectin benzoate + Thiamethoxam 3.0% + 12.0% WG was the more effective in reducing the population of Bihar hairy caterpillar as compared to other insecticides *viz.*,

Emamectin benzoate 5% SG, Cartap hydrochloride 50% SP, Spinosad 45% SC, Chlorantranilliprole 18.5% SC and Chlorfluazuron 5.4% EC

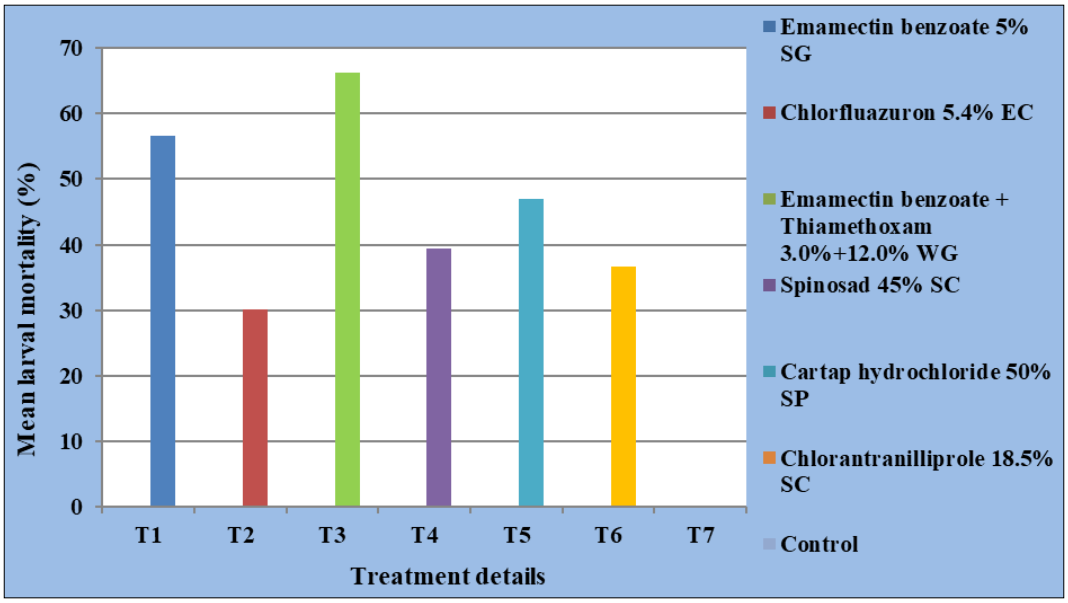

Fig 1: Bio-efficacy of modern insecticides against Bihar hairy caterpillar, *Spilosoma obliqua* (Walker) under laboratory condition during *Kharif* 2019.

Reference

1. Adsule VM, Kadam MV. Studies on the bionomics of Bihar hairy caterpillar, *Spilosoma obliqua* Walker on sunflower (*Helianthus annus* L.). Journal of Maharashtra Agricultural University 1979;4(3):249-252.
2. Gupta G, Bhattacharya AK. Assessing toxicity of post-emergence herbicides to the *Spilarctia obliqua* Walker (Lepidoptera: Arctiidae). J Pest Science 2008;81:9-15.
3. Gyawali BK. Damage and yield loss of soybean from hairy caterpillar (Lepidoptera: Arctiidae). Quarterly Newsletter 1988;31(3):35-41.
4. Hussain M, Begum M. Food preference of jute hairy caterpillar *Spilosoma obliqua* (Walk.) on some varieties of jute. Bangladesh J Entomology 1995;5(1&2):57-59.
5. Kabir AKMF, Khan SA. Bioassay of some insecticides for the control of jute, hairy caterpillar, *Diacrisia obliqua* Walk. Indian Journal of Science and Technology 1968;6(1&2):131-138.
6. Murugesan K, Dhingra S. Variability in resistance pattern of various groups of insecticides evaluated against *Spodoptera litura* (Fabricius) during a period spanning over three decades. J Entomol. Res 1995;19(4):313-319.
7. Singh S, Seghal SS. Studies on growth and development of *Spilosoma obliqua* (Walker) on different food plants. Indian Journal of Entomology 1992;54(4):471-482.
8. Srivastava KP. A Text Book of Applied Entomology, Vol-II. Kalyani Pub 1993, 266.
9. Suryawanshi DK, Trivedi HK, Jatav HR, Kureel MK. Efficacy of chemical insecticides against Bihar hairy caterpillar *Spilosoma obliqua* Walker (Lepidoptera: Arctiidae), under laboratory condition. International Journal of Agriculture Sciences 2020;12(2):9474-9475.