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RESEARCH NOTE

Evaluation of different insecticides against leaf roller, *Pyrausta coclesalis* Walker (Lepidoptera: Pyraustidae) in bamboo

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ABSTRACT: Studies were carried out during 2021-2022 to evaluate toxicity levels of different insecticides against larvae of bamboo leaf roller *Pyrausta coclesalis* (Lepidoptera: Pyraustidae) are one of the most important group of leaf feeders on bamboo (Family: Poaceae) in Central India. Spinosad 45 SC (0.03%), profenofos 50 EC (0.04%), Cypermethrin 25 EC (0.03%), fenvalerate 20 EC (0.03%), chlorantraniliprole 18.5 SC (0.03%) and bio pesticide Azadirachtin 10000 PPM (0.05%) at the recommended concentration was evaluated against of bamboo leaf roller at the Division of Forest Protection, Tropical Forest Research Institute, Jabalpur, Madhya Pradesh, India. The study revealed that spinosad 45 SC (0.03%), profenofos 50 EC (0.03%) and cypermethrin 25 EC (0.03%) were effective with the maximum larval mortality of 91.66, 83.33 and 75 percent at 72 hours after treatment followed by fenvalerate 20 EC (0.03%) and Chlorantraniliprole 18.5 SC (0.03%) which recorded similar mortality of 66.66 were at par to each other at the same period of observation. Among bio pesticide azadirachtin (0.05%) treatment recorded least larval mortality of leaf roller 58.33 percent at 72 hours after treatment.

Key words: Bamboo, bioassay, insecticides, leaf roller, *Pyrausta coclesalis*

Bamboo, belonging to the family Poaceae, has always been a material of immense importance to the culture of south-east Asia. Bamboo plays an important role in the life of human beings. One third of the human race at least uses bamboo for several purpose. Very few plant species have inspired such a wide variety of uses as bamboo. Bamboo has vast spectrum of uses. Bamboo is the fastest growing species. It is a favoured species in the national afforestation programmes being a marvellous substitute of timber towards meeting the industrial and rural requirements, checking erosion, conserving soil and moisture. Bamboo has an important industrial role in paper pulp manufacture, especially in China and India. Some of the species of bamboo are edible. Some species yield medicine (Dutta and Tomar, 1964; Tewari, 1992). Bamboo has a rich complex of insect fauna and suffers assiduously from insect damage (Singh and Bhandari, 1988; Tewari, 1992). There is a dearth of literature on bamboo entomology, especially impact of insects on growth and quantification of economic losses. About 170 species of insects have been reported to be associated with different species of bamboos in India and adjacent countries. However, defoliators are the main enemies of bamboo and among all; leaf rollers cause severs epidemic defoliation in bamboo (Mathur, 1943). The most devastating bamboo leaf rollers that occur in Indian sub-continent are: *Pyrausta bambucivora* Moor and *Crypsiptya coclesalis* Walker (syn. *Pyrausta coclesalis*) (Lepidoptera: Pyralidae: Pyraustinae) causing serious defoliation, resulting in reduced vigour and even the death of culms. Damage is found to be more severe in nurseries and plantations than in natural stands and individual plantings (Tewari, 1992; Pal *et al*., 1996). Among the various methods of insect pest management, the use of insecticides forms the first line of defence against the insect pests. Newer insecticide molecules may be a better alternative than the application of conventional synthetic insecticides in the context of environmentally benign management tactics so also in order to mitigate the adverse effect on the total environment. In many cases, alternate or eco-friendly method of insect pest management offers adequate level of pest control with less hazards and safe to non-target organisms (Chavan *et al*., 2012). The present investigation was planned to evaluate such conventional and new insecticides profenofos 50 EC (0.03%), cypermethrin 25 EC (0.03%), fenvalerate 20 EC (0.03%), chlorantraniliprole 18.5 SC (0.03%) and bio pesticide spinosad 45 SC (0.03%), Azadirachtin 10000 ppm (0.05%) against *P. coclesalis* under laboratory conditions.

Table 1. Bioassay of different insecticides against bamboo leaf roller *Pyrausta coclesalis* at laboratory condition.

Treatments	Concentration	Larval mortality % (HAT*)		
		24 (HAT)	48 (HAT)	72 (HAT)
		75.0*	83.33	91.66
Spinosad 45 SC	0.03%	(60.0)	(65.90)	(73.21)
		66.66	75.0	83.33
Profenofos 50 EC	0.03%	(54.73)	(60)	(65.90)
		58.33	66.66	75.0
Cypermethrin 25 EC	0.03%	(49.79)	(54.73)	(60)
		50.0	58.33	66.66
Fenvalerate 20 EC	0.03%	(45)	(49.79)	(54.73)
		41.66	58.33	66.66
Chlorantraniliprole 18.5 SC	0.03%	(40.19)	(49.79)	(54.73)
		33.33	50.0	58.33
Azadirahctin 10000 ppm	0.05%	(35.26)	(45.0)	(49.79)
				8.33
Control	--	0	0	(16.77)
Standard deviation		0.911	0.863	0.94
Standard error		0.178	0.163	0.178
F value		1.258	0.253	0.895
Sig. Value		0.318	0.952	0.517

*Figures in parenthesis are arc sin √n values of percentages; *HAT: Hours After Treatment

Toxicity studies of different insecticides were carried out in Entomology Laboratory of Forest Protection Division, Tropical Forest Research Institute, Jabalpur, M.P. In this investigation, spinosad 45 SC (0.03%), profenofos (50 EC 0.03%), cypermethrin (25 EC 0.03%), fenvalerate (20 EC 0.03%), chlorantraniliprole (18.5 SC 0.03%) and azadirachtin (10000 ppm 0.05%) and water (control) were tested under laboratory conditions using Completely Randomized Design (CRD) with three replications of each on third instar larvae of *P. coclesalis*. Third instar larvae were collected from Bamboo multiplication garden in TFRI, Jabalpur and used for toxicity test.

To find out the toxicity of each insecticide on the larvae *P. coclesalis*, the stock solutions of above said insecticide were prepared in water and fresh leaves of bamboo were dipped in different insecticide solution for one minute. The leaves treated with treatment solutions were shade dried on a filter paper in open air and ten larvae were released on the treated leaves kept inside the plastic container. Small pin holes were made on top of the container for ventilation. Totally three replications were maintained for each treatment. Based on the mobility of body parts and change in the colour of the body the mortality of larvae was confirmed and the data recorded at 24, 48 and 72 hours after treatment (HAT) and percent mortality were worked out. The data collected under laboratory experiments in Completely Randomized Design were analysed using analysis of variance (ANOVA) using AGRES 3.01 and AGDATA software. Data in the form of percentages were transformed to arcsine values and those in numbers were transformed to √□+0.5 and analysed. The mean values of the treatments were compared using DMRT at 5 per cent level of significance.

The data on per cent mortality of the larvae of the bamboo leaf roller mentioned in Table1 indicated that all the treatments during different observation period showed significant results over control. Spinosad (45 SC), cypermethrin (25EC), fenvalerate (20 EC), profenofos (50 EC), chlorantraniliprole (18.5 SC) and azadiractin (0.15 EC) were evaluated against the control of bamboo leaf roller when applied at different concentrations. All insecticide treatments showed significant differences with the control (mortality observed in control where no insecticide was applied). The highest mortality @ 0.03% with (91.66%) was shown by (Spinosad) followed by (profenofos) @ 0.03% with (83.33%), (cypermethrin)

@ 0.04% with (75%), (fenvalerate) @ 0.03% with (66.66%), (chlorantraniliprole) @ 0.03% with (66.66%), (azadirachtin) @ 0.05% with (58.33%) and control with (8.33%) percent larval mortality of bamboo leaf roller at 24, 48 and 72 hours after treatment respectively (Fig.1). Afzal *et al.* (2002) stated that the reduction in pest population was the greatest in the treatment with karate 2.5 EC (96%) followed by sevin 10 SP (85%). The findings are in agreement with that of Kalia and Joshi (1995) who reported for foliar spraying of 1% *Bacillus thurunginsis* var *kurstaki* against bamboo leaf roller larvae. On the basis of LC_{50} value of a biopesticide Ivermectin, it is recommended to use 0.1% as foliar spray for control of *P. coclesalis* larvae (Roychoudhury, 2012). Lalitha *et al*. (2012) stated that the *Bacillus thuringiensis* against *Helicoverpa armigera* larvae (second instar and third instar) were found treated with *B.t.* strains and recorded mortality in the range of 94.44 and 83.33 %. All the earlier findings are in conformity with the present findings. Radha (2013) Reported cowpea aphid *Aphis craccivora* was effectively controlled using spinosad followed by neem seed kernel extract. These results also confirm the result obtained in the present study. Patidar and Kumar (2018) recorded that Chlorantraniliprole 18.5% SC and Flubendiamide 39.35% SC found most effectives on larval population of *S. oblique.* Present finding are in line with the findings of above workers.

CONCLUSION

The data on percent mortality after 72 hours of exposure showed that the chemical pesticide showed not only significant but superior results over control. Therefore it is suggested that the population of bamboo leaf roller larvae can be checked by spraying chemical insecticides *viz.,* spinosad 45 SC (0.03%), profenofos 50 EC (0.03%) and cypermethrin 25 EC (0.03%) are effective pesticides against bamboo leaf roller and can act as better tools in insect pest management for leaf roller menace in bamboo nursery and young plantations.

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REFERENCES

Afzal, M., Aleem, M. and Basit, M. 2002. Comparative efficacy of different insecticides against sesame leaf webber/pod borer, *Antigastra catalaunalis* (Dup.). *Annals of Plant Protection Sciences*, **24** (2): 149-152.

Dutta, J.J. and M.S. Tomar (1964). Bamboo Forest of Madhya Pradesh. Forest Bulletin No.8, Government Regional Press of Madhya Pradesh, Rewa.71pp.

Kalia, S. and Joshi, K.C. (1995). Efficacy of three commercially available products of *Bacillus thuringiensis* Berliner against bamboo leaf roller, *Crypsiptya coclesalis* Walker. *Myforest*, **31** (4): 1-3.

Lalitha, C., Muralikrishna, T., Sravani, S. and Devaki, K. 2012. Laboratory evaluation of native *Bacillus thuringiensis* isolates against second and third instar *Helicoverpa armigera* (Hubner) larvae. *Journal of Biopesticide*, **5** (1): 4-9.

Mathur, R.N. (1943). Bamboo defoliators. *Indian Entomological Science* (1): 117-128.

Radha R. Comparative studies on the Effectiveness of Pesticides for Aphid control in Cowpea. Research Journal of Agriculture and Forestry Science. 2013; **1** (6): 7-18.

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