International Journal on Recent Advancement in Biotechnology & Nanotechnology
Vol. 2, Issue 2 - 2019

TOXICITY OF VARIOUS CONCENTRATIONS OF BUPROFEZIN UNDER PUPAL DIP METHOD OF TREATMENT ON BIOMASS ACCUMULATION IN LARVA OF *BLACK HAIRY CATERPILLAR*. (LEPIDOPTERA: ARCTIIDAE)

S.P. SRIVASTAVA[*], YOGESH KUMAR MISHRA[**]

ABSTRACT

The 15th day larvae, not treated earlier at the pupal stage, had a more biomass (110.94mg) than that treated earlier at the same stage with any concentration of the buprofezin significantly (P<0.01). As regards the effect of different concentration of the buprofezin significantly (P<0.05). The 15th day larvae, not treated earlier at the pupal stage, had a more biomass (110.94mg) than that treated earlier at the same stage with any concentration of the buprofezin (P<0.01). As regards the effect of different concentrations on the biomass of the 15th day larva, it decreased with increase in concentration, varying from 20.94 to 71.12mg and depended on the concentration (P<0.05).

KEYWORDS: Pupal, Biomass, Buprofezin, Larva.

INTRODUCTION

The insect growth regulator, a fourth generation insecticide, accidents came in the existence in the Laboratory of Philips, Duphar. The Netherlands, while preparing the herbicides. *First insect growth regular synthesized, was diflubenzuron,* which belong Benzoyl phenyl urea group. Later, different groups of insect growth regulars having chitin biosynthesis inhibiting property, were identified. The different groups of insect growth regulators, through differ in their chemical structure and mode of action, but have a common characteristics i.e., they exhibit lethal action in juvenile stage and sterility in sexually mature adults, thus the pest population declines very rapidly. Besides, they also inhibit the food consumption and growth of individuals, which survive sublethal treatments. This becomes an additional benefit in the field of pest management as surviving pest will consume less food, causing least injury to agro-ecosystem. The suppression of pest population by the use of insect growth regulators has already been achieved by many works.

MATERIAL & METHOD

In Pupal dip method pupae were dipped in a particular concentration for 2 minutes. After dipping for the fixed duration the pupae were taken out from that concentration of the insect growth regulator.

[*]Department of Zoology, P.P.N. College, Kanpur, U.P., India.
[**]Department of Zoology, Shiv Darshan Lal Degree College, Fatehpur, U.P., India.
Correspondence E-mail Id: editor@eurekajournals.com

 ISSN: 2582-1571

The solvent and the insecticides adhering to the surface of the pupae were soaked in the blotting paper and such treated pupae were maintained for further studies. This method form henceforth will be referred as PDM in the text. In Residue Film method of treatment 1 to 2 hr old adults were exposed to a thin file of residue of a concentration of particular insect growth regulator. For obtaining the thin film of the chemical as residue, about 10ml of a concentration of a chemical was poured in a petridish (10 cm dia) and the petridish was tilted in different ways to spread the chemical on the whole floor area of the petridish and its raised periphery. Thereafter, the petridish was kept in the air for the evaporation of the solvent. This led to the formation of a thin film of a concentration of insect growth regulator in the petridish as residue. Adults were left in petridishes having thin film of the insect growth regulator for 24 hours. The petridishes were covered by thin muslin cloth to prevent to the escape of the adults. Such treated adults were employed in the different experiments as described later on. This method of treatment will be designed as RFM in the text from here onwards. In adults feeding method of treatment a concentration of a particular insect growth regulator was mixed in 10 per cent sugar solution which was supplied to adults for feeding. From here onwards this method of treatment will be referred as AFM in the text.

RESULT & DISCUSSION

On the 5th day, the biomass accumulation in larva (4.32mg), not tested earlier at pupal stage with buprofezin, was more than that of the larva treated earlier at pupal stage with any concentration of the buprofezin ($P< 0.05$). On this day the larval biomass varied from 1.65 to 3.84 mg in response to treatment earlier at the pupal stage with different concentrations of the buprofezin separately and decreased with increase in the concentration of the insect growth regulator. The statistical analysis revealed that on the basis of biomass accumulation in larva, these concentrations of buprofezin could be arranged in three group: the first group included 0.0001 per cent concentration; second group included 0.001, 0.01 and 0.10 percent concentrations and the third group consisted of 0.50 and 1.00 per concentration. Each concentration of the second group affected the larval biomass alike and like-wise each concentration of the third group affected it identically ($P< 0.05$). On the basis of the larval biomass on the 5th day, the above concentrations of the burpfezin could be arranged as 0.0001%> 0.001, 0.01 and 0.10%, 0.50 and 1.00%. On the 10th day, the larva, not treated earlier at pupal stage acquired more biomass (22.66mg) than that treated earlier at the pupal stage with any of the concentrations of the buprofezin ($P<0.01$). In response to the pupal treatment earlier the larval weight varied from 6.81 to 15.74 mg among the different concentration of insect growth regulator (0.0001 to 1.00%). The larval biomass differed with the concentrations of the buprofezin significantly ($P<0.05$). The 15th day larvae, not treated earlier at the pupal stage, had a more biomass (110.94mg) than that treated earlier at the same stage with any concentration of the buprofezin significantly ($P<0.01$). As regards the effect of different concentration of the buprofezin significantly ($P<0.05$). The 15th day larvae, not treated earlier at the pupal stage, had a more biomass (110.94mg) than that treated earlier at the same stage with any concentration of the buprofezin ($P<0.01$). As regards the effect of different concentrations on the biomass of the 15th day larva, it decreased with increase in concentration, varying from 20.94 to 71.12mg and depended on the concentration ($P<0.05$) (Table 1). The similar result was also noticed by Aydin H and Gurkan M.O. (2006), ABD El–MAGEED A.E.M. *et. al.* (2008), Corbel V.Stankiewicz *et. al.* (2006), EL-ASWAD A.E. (2007) Efficiency of certain insecticides and insect growth regulators alone or

 ISSN: 2582-1571

in mixture with chloypyrifos for the integrated control of the Egyptian cotton leafworm, Khan, H.A. *et. al.* (2013), Li SQ *et. al.* (2005), Mathiyazhagan, N. & Natarajan, D. (2013) Phytoremediation efficiency of edible and economical crops on waste dumps of bauxite mines, Salem district, Tamil Nadu, Parugrug ML and Roxas AC (2008), Rozpara E et. al. (2016), Swelm E.S. and Sayed M.A. (2006), Sarwar M and Salman M (2015), Senthil-Nathan S (2015), Shahab-Ghayoor H and Saeidi K (2015), Szolyga B *et. al.* (2014) Chemical composition and insecticidal activity of *Thuja occidentalis* and *Tanacetum vulgare* essential oils against larvae of the lesser mealworm, *Alphitobius diaperinus*, Tabari MA *et. al.* (2015) and Tak JH *et. al.* (2016).

Table-1.Toxicity of different concentrations of Buprofezin under PDM modes of treatment on biomass accumulation in larvae of *Pericallia ricini* Fab. (Values are mean I.S.E.)

Mode of treatment	Concentration (%)	Larval biomass (mg)+ S.E. on					
		5th day		10th day		15th day	
Pupal Dip Method (PDM)		Value	S.E.	Value	S.E.	Value	S.E.
	.0001	3.84	0.12	15.74	0.34	71.1	0.42
	.001	2.82	0.14	13.85	0.22	56.74	0.68
	.01	2.44	0.15	11.51	0.32	49.25	0.62
	.10	2.32	0.12	10.34	0.38	36.82	0.55
	.50	1.93	0.15	8.94	0.33	29.73	0.46
	1.00	1.65	0.06	6.81	0.35	20.94	0.48

Fig. In Parentheses and Transformed value.

REFERENCES

[1]. Aydin H; Gurkan M.O. (2006); The efficacy of spinosad on different strains of *Spodoptera littoralis* (Boisduval) (Lepidoptera; Noctuidae). *Turkish Journal of Biology*, 30; 5-9.

[2]. ABD El–MAGEED A.E.M. ANWAR E.M. ELGOHARY L.R.A. (2008); Biochemical side effects for some commercial biocides on cotton leafworm. *Archives of Phytopathology and plant Protection* 41; 227-232.

[3]. Corbel V.Stankiewicz M. Bonnet J., Grolleau F., Hougard J.M. Lapiped B (2006); Synergism between insecticides permiethirn and propoxur occurs through activation of presynaptic muscarinic negative feedback of acetylcholine relase in the insect central nervous system. *Neuro Toxicology* 27; 508-519.

[4]. EL-ASWAD A.E. (2007): Efficiency of certain insecticides and insect growth regulators alone or in mixture with chloypyrifos for the integrated control of the Egyptian cotton leafworm. *Journal of Pest Control and Environmental Sciences*, 15(2); 29-48.

[5]. Khan, H.A., Akram, W. Shad, S.A. & Lee, J.J. (2013). Insecticide mixtures could enhance the toxicity of insecticides in a resistant dairy population of *Musca domestica* L. *PloS One,* 8(4), 609-629.

[6]. Li SQ, Fang YL, Zhang ZN (2005) studies and applications of botanical insect antifeedants, *entomal Know*l 42; 491-496.

[7]. Mathiyazhagan, N., & Natarajan, D. (2013). Phytoremediation efficiency of edible and economical crops on waste dumps of bauxite mines, Salem district, Tamil Nadu. On a sustainable future of the Earth natural resources. Springer earth system science. DOI https://doi.org/10.1007/978-3-642-32917-3-31.

[8]. Parugrug ML, Roxas AC (2008) Insecticidal action of five plants against maize weevil, *Sitophilus zeamais* Mostsch. (Coleoptera; Curculionidae) *J Sci Technol* 8; 24-38.

 ISSN: 2582-1571

[9]. Rozpara E, Morgas H, Filipczak J, Meszka B, Holdaj M. Labanowska BH, Sekrecka M, Sobiczewski P, Lisek J, Danelski W (2016) Metodyka produkcji owocow aronii metoda ekologiczna (wydanie pierwsze), Inhort, Skierniewice, p 27.

[10]. Swelm E.S. Sayed M.A. (2006): Joint action of methomyl, carbaryl, esfenvalerate and profenofos and its latent effect on the cotton leafworm, *Spodoptera littoralis. Journal of Pest Control and Environmental Science* 14: 317-331.

[11]. Sarwar M, Salman M (2015) Toxicity of oils formulation as a new useful tool in crop protection for insect pests control. Int J Chem Biomol Sci 1:297-302.

[12]. Senthil-Nathan S (2015) A review of biopesticides and their mode of action against insect pests. In: Thangavel P, Sridevi G (eds) Environmental Sustainability. Springer, Delhi, pp 49-63.

[13]. Shahab-Ghayoor H, Saeidi K (2015) Antifeedant activities of essential oils of *Satureja hortensis* and *Fumaria parviflora* against Indian Meal Moth *Plodia interpunctella* Hubner (Lepidoptera; Pyralidae). Entomol Ornithol Herpetol 4:1-4, https://doi.org/10.4172/2161-0983.1000154.

[14]. Szolyga B, Gnilka R, Szumny Szczepanik M (2014) Chemical composition and insecticidal activity of *Thuja occidentalis* and *Tanacetum vulgare* essential oils against larvae of the lesser mealworm, *Alphitobius diaperinus.* Entomol Exp Appl 151:1-10. https://doi. org/10.1111/eea. 12166.

[15]. Tabari MA, Youssefi MR, Barimani A, Araghi A (2015) Carvacrol as a potent natural acaricide against *Dermanyssus gallinae.* Parasitol Res 114:3801-3806. https:/doi. org/10.1007/s00436-015-4610-0.

[16]. Tak JH, Jovel E, Isman MB (2016) Contact, fumigant, and cytotoxic activities of thyme and lemongrass essential oils against larvae and an ovarian cell line of the cabbage looper, *Trichoplusia* ni. J Pest Sci 89:183-193.

 ISSN: 2582-1571