Research Journal of Animal, Veterinary and Fishery Sciences _____E-ISSN 2320 – 6535
Vol. **4(9),** 1-4, October **(2016)** *Res. J. Animal, Veterinary and Fishery Sci.*

Short Communication

Growth Controlling Effect of Thuricide on Diacrisia Obliqua

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Available online at: www.isca.in, www.isca.me
Received 24th September 2016, revised 8th October 2016, accepted 22nd October 2016

Abstract

Diacrisia obliqua Walker (Lepidoptera: Arctiidae) is a well known Pest of various economically important crops. It causes a huge loss to farmers. In order to control this pest, thuricide (a bacterial preparation) was administered and tested by Leaf Dip Method (LDM) and Topical Method (TM). It was found that thuricide reduces the accumulation of biomass in larva, pupa and adults from lowest concentration (0.05%) to highest concentration (1.0%). Biomass decreases with the increasing concentration of thuricide and it differed significantly with the concentration of bacterial preparation (P<0.01). It was also noticed that thuricide gives better results under LDM.

Keywords: *Diacrisia*, Thuricide, Leaf Dip Method, Topical Method, Biomass, Pest.

Introduction

Diacrisia obliqua is a harmful polyphagous pest causing remarkable damage to several crops. Farmers have been using chemical pesticides to control Diacrisia. But Chemical pesticides are injurious to human and pet animals. They also cause development of resistance. They cause environmental pollution. So microorganisms like bacteria, virus and fungi are being used as biopesticides and have been tested against various pests[1]. *Bacillus thuringiensis* (*B.t.)* is a gram positive bacteria. It has been reported to be pathogenic to over 500 insect species. It secretes a number of toxins during spore formation. δ endotoxin is one of the most important toxins. It is proteinaceous in nature[2]. It works on the cells of midgut epithelium upon ingestion.

Materials and Methods

Male and female moths were captured in August 2012.They were kept carefully. These insects ensured the regular availability of insects by reproduction. Adults were kept in glass chimneys but the larva were kept in large petridishes. When the larvae were full grown, they were transferred to pneumatic trough. 10-15 cm thick soil was kept in troughs on their bottom, for larvae to pupate. The biomass of larva, pupa and adult were recorded as a parameter of growth. Larval biomass was recorded at 5th, 10th and 15th day.

Thuricide HP is a commercial preparation of *B.t.*. It is a wettable powder. It contains $30x10^6$ viable spores of *B.t.* To increase the stickyness of thuricide, we added 2% skimmed milk powder to it and we used two methods to test the effect of thuricide on insects. i. Leaf Dip method (LDM): In this method, leaves that were to be given to larvae to feed on were treated with different concentration of thuricide. ii. Topical Method (TM): In this method, a thin film of residue of thuricide was prepared and the adults were exposed to it.

Various statistical analysis have been applied to study the nature and relationship between variables, to know the reliability and precision in the results obtained, to test the significant difference between observed and expected values. These statistical methods include- Standard Error, Test of Significance (Chi square Test) and Regression Equation.

Observation: The results obtained in different experiments are presented in Table-1 and Table-2.

Results and Discussion

Under LDM larva of control experiment accumulated 4.28 mg biomass on the 5thday of its life. Whereas the larval biomass on the same day varied from 1.84 to 3.92 mg under the effect of various concentrations of thuricide.

On the 10th day the control larva had 22.68 mg biomass which was significantly more than that of the larva on the same day under the influence of different strength of thuricide from 0.05 to 1.00 per cent (P<0.01). Biomass of larva on 10th day varied from 7.26 to 16.78 mg under the treatment of thuricide by LDM.

The biomass of control larva was 99.90 mg on 15th day and it was significantly more than that of the larva of the same day under the influence of any concentration of thuricide used (P<0.01). In response to the thuricide under LDM, the biomass of larva varied from 24.58 to 88.46 mg on 15th day and it differed significantly with the strength of thuricide (P<0.01).

Table–1
Effect of different concentrations of "Thuricide" under different modes of treatment on biomass accumulation in larva of *D. oblique* (Values are mean ± S.E.)

Mode of treatment	Concentration (%)	Larval biomass (mg) ± S.E. on		
		5th day	10th day	15th day
L.D.M.	0.05	3.92±0.20	16.78±0.25	88.46±0.63
	0.10	3.18±0.14	13.94±0.43	74.64±0.56
	0.50	2.88±0.15	12.86±0.18	56.46±0.36
	0.75	2.22±0.16	10.61±0.10	30.34±0.24
	1.00	1.84±0.16	7.26±0.44	24.58±0.28
T.M.	0.05	3.86±0.26	18.67±0.14	90.43±0.36
	0.10	3.86±0.13	16.62±0.26	76.38±0.16
	0.50	2.94±0.14	13.24±0.16	57.34±0.24
	0.75	2.24±0.16	12.62±0.18	34.24±0.44
	1.00	2.00±0.10	9.89±0.16	28.68±0.45
	Control	4.28±0.16	22.68±0.52	99.90±0.62

Table–2
Effect of "Thuricide" at different concentrations under different modes of treatment on biomass accumulation by pupa and adults of *D. oblique* (Values are mean ± S.E.)

Mode of treatment	Concentration (%)	Weight (mg) ± S.E. of		
		Pupa	Male	Female
L.D.M.	0.05	130.47±0.33	92.43±0.44	98.52±0.53
	0.10	124.62±0.44	79.48±0.75	86.54±0.42
	0.50	114.62±0.32	69.36±0.56	74.48±0.42
	0.75	96.34±0.24	60.42±0.66	64.62±0.82
	1.00	66.44±0.23	49.32±0.45	58.25±0.83
T.M.	0.05	132.48±0.82	95.66±0.76	100.88±0.35
	0.10	128.56±0.36	88.52±0.62	89.56±0.64
	0.50	116.47±0.92	78.65±0.54	76.68±0.62
	0.75	99.78±0.85	64.58±0.56	66.92±0.85
	1.00	69.72±0.63	52.48±0.42	60.48±0.55
	Control	132.64±0.82	99.86±1.83	103.65±1.28

Under TM larva of untreated adult acquired significantly more weight (4.28 mg) on the 5th day in comparison to larva of treated adult with any concentration of thuricide (P<0.01). Larval biomass varied from 2.00 to 3.86 mg in response to different concentrations of thuricide under TM and it seemed to decrease with increasing concentrations of thuricide.

On the 10th day the larva of untreated adult acquired more weight (22.68 mg) than that of treated adult with any concentration of thuricide (P<0.05) and it varied from 9.89 to 18.67 mg.

The control larva on 15th day accumulated 99.90 mg biomass, whereas it obtained 28.68 to 90.43 mg significantly in response to thuricide from 0.05 to 1.00 % and it tended to decrease with increasing concentration of thuricide.

The biomass of pupa in response to various concentration of thuricide under LDM varied from 66.44 to 130.47 mg, decreasing with increasing concentrations and it depended on the concentration (ANOVA, P<0.01) while untreated pupae were significantly heavier (132.64 mg).

Weights of male moths varied from 49.32 to 92.43 mg in response with thuricide under LDM and as per ANOVA , the weight of male moths depended on the concentration of thuricide (P<0.01) with a clear tendency of decrease with increasing concentration. Same results were found in case of female moths whose weights varied from 58.25 to 98.52 mg.

Under topical treatment of adults with different concentrations of thuricide, the weight of pupa varied from 69.72 to 132.48 mg and it differed with concentrations of thuricide (P<0.01). In this respect, data revealed that the acquisition of biomass in pupa declined with increasing concentrations of thuricide.

The males obtained from adults not treated topically with thuricide, was heavier (99.86 mg) than that obtained from adults treated topically with thuricide. The weight of males of treated parents varied from 52.48 to 95.66 mg. Similarly the biomass gained by the females of treated parents varied from 60.48 to 100.88 mg, decreasing with increasing concentration of thuricide and analysis of variance showed it to be dependent on the concentration of thuricide (P<0.01).

The results show that Thuricide has potential to reduce the growth of insect even at a very low concentration (0.05), when administered by LDM or TM. However LDM is more effective than TM.

It was observed that there was a regular increase in weight loss of larva, pupa and adults from lowest concentration (0.05%) to highest concentration (1.0%).

The results reveal that there is an indirect proportionality between the biomass of Lava, pupa and adults and concentration of microbial preparation. Results also show that Thuricide is identically effective in both sexes.

The results have shown that Thuricide has potential to reduce the growth *in D.obliqua* even at a very low concentration (0.05)[3]. Moawad *et. al.*[4] have also found same effects of different microbial pesticides in other insects.

As per effect of bacterial treatment on larval mortality on larval mortality of *D. obliqua,* Govindrajan et.al.[5] observed this phenomenon at prepupal stage of *S. litura* after the treatment with thuricide. Enough literature is not available on weight loss in insects during treatment with pathogens. These findings have further been substantiated by the study of Srivastava[6] against *P. demoleus*.

Narayan and Jayraj[7] also found same results *in P. demoleus* as regard to the weight loss of larva, however Fast and Regniere[8] did not found any difference in weight of treated insects .In present study weight loss may be due to cessation of feeding at early stage.

B.t. showed adverse effect on size, weight and survival of pupa. Sareen et.al.[9] in *S.litura* and Fast and Dimond[10] in *C. fumiferana* reported the reduction in pupal weight after treatment with *B.t*. The findings of the present investigation are in full alignment with the reports of earlier workers.

Conclusion

Above study shows that thuricide has a potential to control *Diacrisia obliqua* by reducing the growth of larvae. Thuricide, being a biopesticide has no adverse effect on environment unlike other chemical pesticides used now a day. Therefore, thuricide can be used in fields to control this pest in order to reduce the chemical pesticides leading to health hazards.

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