Biospectra : ISSN : 0973-7057, Vol. 15(1), March, 2020, pp. 355-358
An International Biannual Refereed Journal of Life Sciences

43(AS).
Animal Science

ISSN : 0973-7057

Int. Database Index: 663 www.mjl.clarivate.com

Study of dipel on development of *Diacrisia obliqua* (Walker)

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Received : 3rd February, 2020; Revised : 20th February, 2020

Abstract : *Diacrisia obliqua* Walker (Lepidoptera: Arctiidae) is a phytophagous insect causing great loss to different crops. To control these pest different concentrations of dipel were administered by Leaf Dip Method and Topical Method. It was observed that dipel reduces the percentage of pupation in larva. It prolongs the larval and pupal period. It causes a clear reduction in emergence of adult insect.

Keywords : ***Diacrisia obliquae,*** **dipel, larva, Leaf Dip Method**

INTRODUCTION

Bihar hairy caterpillar, *Diacrisia obliqua* is a notorious polyphagous pest causing damage to several crop plants. Chemical insecticides have been used by farmers to control this pest but older larva survived their toxicity. Chemical pesticides are also harmful to human and pet animals. They also cause resistance development and environmental pollution. So biopesticides are being popular day by day. Microbial agents like virus, bacteria and fungi have been widely used and tested to control several crop pests.

Bacillus thuringiensis (*B.t.*) is a gram positive bacterium, found quite effective to control lepidopteran pests. *B.t.* has been found pathogenic to more than 525 insect species. A number of toxins like endotoxin are produced by it. This toxin is a protein produced when spores are formed. It targets the insect's midgut epithelium when ingested. In the light of previous work done and literature available, following work was planned to study the effect of Dipel (a commercial preparation of *B.t.)* on growth of *D. oblique*

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MATERIALS AND METHODS

For the study male and female moth were collected and maintained in laboratory to ensure the regular supply of insects. Adults were maintained in glass chimneys and larvas obtained from them were kept in large petridishes. Full grown larvae were transferred to pneumatic trough having 10-15 cm thick soil on their bottom, for pupation.

Dipel is a commercial preparation of *B.t.* whose efficacy has been already evaluated to control different insects. It is a wettable powder containing $25x10^9$ viable spores per gram of final product of *B.t.* var *Kurstaki* (Serotype 3a, b strain HD-1). The concentrations of Dipel

used in this study included 0.05, 0.10, 0.50, 0.75 and 1.0%. 2% skimmed milk powder was added to Dipel to increase its adhering property. Two methods were employed to treat the insects with different bacterial preparations. Leaf Dip method, In this method, small and uniform sized leaves were treated with each concentration of Dipel and Topical Method (TM), In this method 2 hr old adults were exposed to a thin film of residue of Dipel.

RESULTS AND DISCUSSION

Any concentration of the dipel applied to larvae through food, reduced the larval survival considerably as compared the untreated adults. As regards the effect of different concentrations of this bacterial preparation on the larval survival, the percentage of pupation, varying from 25.26 to 69.42 per cent and decreasing with the increasing concentration differed from concentration to concentration as per chi-square lest.

Further, any concentration of this microbial preparation prolonged the larval stage as compared the untreated condition ($P<0.05$) and the larval stage, varying from 22.76 to 36.46 days in response to treatment by leaf dip method and showing direct proportionality to the concentration, differed with the concentrations of thuricide ($P<0.05$).[1]

Every concentration of the Dipel under leaf dip method, caused considerable reduction in emergence and marked prolongation in pupal stage ($P<0.05$). Tending to decrease with the advancing concentration, the emergence, varying from 22.12 to 71.72 per cent, differed significantly with concentrations of the thuricide ($P<0.05$).[2]

Like the emergence the pupal period, varying from 14.82 to 29.76 days among different concentrations of the Dipel also differed with different concentrations but, it tended to be directly proportional to the concentration of the microbial preparation. Further, the net mortality also varying from 52 to 94 per cent among different concentrations of the Dipel, differed from concentration to concentration ($P<0.05$) and it tended to decrease with the increasing concentrations significantly.

The life span of progeny male and female adults of untreated parents was more as compared to that earlier treated by leaf dip method with any concentration of the Dipel ($P<0.05$). The longevity of adults, varying from 3.76 to 7.92 days in male and from 3.85 to 8.24 days n female and tending to decrease with the increasing concentration, differed significantly with different concentrations ($P<0.05$).[3]

The larva of the untreated adults acquired considerably more pupation (89.43%) than that of the adults treated topically with any concentration of the Dipel ($P<0.05$). The pupation varied from 27.12 to 69.85 per cent among residue films of different concentrations and tending to decrease with the advancing concentration, the larval survival was affected by the residue film concentration significantly ($P<0.05$).[4]

In response to parent adults treatment with residue films of different concentrations of Dipel the duration of the larval stage varied from 19.64 to 38.30 days and showed a tendency of increase with the increasing concentration in comparison to the untreated adults ($P<0.05$).

The pupa of the untreated adult gained hundred per cent emergence in comparison to that of the adults treated with any concentration of the Dipel through food ($P<0.05$). In emergence, varying from 29.76 to 72.82 percent and tending to be directly proportional to the concentration differed significantly from concentration to concentration ($P<0.05$).[4]

The pupal period which varied from 14.94 to 28.70 days among residue film concentrations from 0.05 to 1.0 percent and tended to be directly proportional to the strength of the residue film was found to be effective differently by the residue films of concentrations of this microbial preparation ($P<0.05$).

The net mortality, varying from 50 to 94 percent showing direct proportionality to the concentration, differed significantly with the residue films of different concentrations of the Dipel ($P<0.05$).[5]

Every concentration of the Dipel applied as residue film to the adult reduced the life-span of both male and adults ($P<0.05$). As regards the influence of different concentrations of the Dipel as residue films on the longevity of adults, it varying from 3.68 to 8.60 days in male and 3.94 to 08.90 days in female and declining with the advancing concentration of Dipel concentration of the residue film ($P<0.05$).[6]

Table 1: Effect of dipel on development at different concentrations

Mode of treatment	Concentration (%)	Pupation (%)	Larval period (days)	Emergence (%)	Pupal period (days)
L.D.M	0.05	69.42	22.76±0.68	71.72	14.82±0.42
	0.10	58.48	26.52±0.66	65.65	15.76±0.44
	0.50	48.24	28.27±0.28	54.72	19.76±0.42
	0.75	36.37	33.32±0.37	42.65	23.86±0.56
	1.00	25.26	36.46±0.72	22.12	29.76±0.40
T.M	0.05	69.85	19.64±0.75	72.82	14.94±0.22
	0.10	58.40	24.78±0.69	68.47	15.78±0.34
	0.50	48.32	26.85±0.42	56.32	20.87±0.46
	0.75	36.72	30.75±0.17	48.11	23.60±0.06
	1.00	27.12	36.30±0.12	29.75	28.70±0.82
	Control	89.43	16.35±0.42	100.00	12.76±0.32

Table 2: Effect of dipel on longevity in male and female at different modes of treatment

Mode of treatment	Concentration(%)	Longevity(in days)	
		Male	Female
L.D.M	0.05	7.92±0.22	8.24±0.42
	0.10	7.86±0.44	7.84±0.44
	0.50	6.06±0.42	6.06±0.28
	0.75	5.04±0.22	5.50±0.20
	1.00	3.76±0.15	3.86±0.25
T.M	0.05	8.60±0.22	8.90±0.42
	0.10	7.02±0.42	7.00±0.46
	0.50	6.06±0.45	6.87±0.37
	0.75	5.66±0.14	5.80±0.88
	1.00	3.68±0.32	3.94±0.36
	Control	11.35±0.22	13.76±0.24

Table 3: Effect of dipel on longevity in male and female at different modes of treatment

Mode of treatment	Concentration applied (%)	No. of larvae reared	No. of larvae died	No. of pupae died	Total death	%net mortality
L.D.M	0.05	60	24	12	36	52
	0.10	60	28	18	46	76
	0.50	60	34	19	53	86
	0.75	60	40	16	56	92
	1.00	60	45	12	57	94
T.M	0.05	60	19	16	35	50
	0.10	60	27	22	49	78
	0.50	60	36	17	53	86
	0.75	60	42	14	56	92
	1.00	60	43	14	57	94
	Control	60	10	NIL	10	-

CONCLUSION

The above study reveals that Dipel is a promising biopesticide. It has potential to control the pests especially lepidopteran. It is more significant in recent farming practices because of it is safe to environment.

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