Research Article

Effect of Pesticides on Larval Weight and Duration of Silkworm *Bombyx mori*

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ABSTRACT

The silk worm Bombyx mori fed with the mulberry leaves sprayed with pesticides to control pests influenced with development. L.C 50 dose for an organophospharous pesticide, Dichlorovos and plant based pesticide neem oil was estimated and the Neem pesticide was found to inhibit the developmental stages of Bombyx mori at a high level when compared to Dichlorovos. The larval and pupal duration increased in pesticide treated worms which depends on the concentrations of the pesticicdes.Vijay neem had affected the silkworm larval and pupal weight in higher percentage than dichlorovos.

Keywords: *Bombyx mori*; silk worm; neem oil; biopesticides, Dichlorovos.

1. INTRODUCTION

Insect pests take a heavy toll of mulberry . The insecticides applied for the control of mulberry pests have greater impact on silkworm. Pesticides leave residues in mulberry leaves which inturn affect the sensitive silk worm.Perusalof literature in this aspect reveals that the loss of body weight was noticed in silk worm, when exposed to pesticides. Pant and Katiyar (1983), Venkata Reddy et al., (1989) Surendranath (1993) ,Singh (1990). Pesticide residues were also thought to be transmitted to the silk worm eggs, embryos and pupae affectd later generation Watanabe and Takano (1966), Kuwanna et al., (1968).Along with chemical pesticides neem based insecticides are known to possess several adverse biological effects on insects like repellency and inhibitory activity Schmutterer (1990), Medina et al., (2004) ,Tiwari et al., (2006), Kodandaram et al., (2008), Jothi et al.,(1999). Azadirachtin affect food intake by exerting strong antifeedant effects against a wide range of insect species Warthen (1989), Mordue (Luntz) & Black well (1993), Meisner et al., (1981 a, b), Ley et al., (1989); Blaney et al., (1990).Hence the purpose of the study was carried out to determine the effect of dichlorovos and neem pesticide on larval and pupal weight and duration.

2. MATERIAL AND METHODS

Eggs of the silk worm breed LXCSR2 were procured from Government sericulture grainage at Tenkasi, Tamilnadu and were raised up to 3rd instar in a rearing house. Controlled temperature (24-27^{0}C) and humidity (75-80%) were maintained and appropriate measures were taken to prevent parasitization by uzifly. The silkworms were fed with mulberry leaves and standard rearing practices were followed (Krishnaswami, 1971). Two pesticides (Dichlorovos, Vijay neem) were used for this experiment. III instars (soon after the second ecdysis) of uniform size from a pooled batch were divided into eleven groups of 100 larvae each. Sublethal concentrations of Dichlorovos (0.0001, 0.0002, 0.0003, 0.0004 and 0.0005%) and Vijay neem (0.001, 0.002, 0.003, 0.004 and 0.005%) were given to the III instar larvae by feeding with pesticide sprayed leaves one time on the first day. Larvae were transferred to rearing tray containing fresh mulberry leaves. Simultaneously control was also maintained. Surviving larvae were kept for pupation and observations on various parameters like larval weight, pupal weight, larval duration, and,pupal duration were recorded. The recorded data were subjected to analysis to determine the significant difference between the various parameters of the treated and untreated insects.

3. RESULT AND DISCUSSION

In the present study the larval weight of silk worm *Bombyx mori* fed with Dichlorovos and Vijay neem sprayed leaves were recorded. It was found out that there was change in the body weight due to the consumption of pesticide sprayed leaves. After the treatment in sublethal dose, the body weight had decreased gradually from third to fifth instars. The mean weight of third instars in the control worm was 1.37±0.12 g where as it was reduced to 1.19 ± 0.01 g at higher concentration of Dichlorovos (0.0005% concentration) and 1.30 ± 0.09 g at lower concentration of Vijay neem (0.001% concentration).

Vijay neem had affected the silk worm (third instar) weight in a higher percentage than Dichlorovos. The mean weight of IV instar in the control was 5.17 ± 0.16 g where as it was reduced to 4.89 ± 0.14 g due to Dichlorovos and 3.50 ± 0.34 g due to neem at higher concentrations.. The mean weight of V instar at first and fourth and sixth day was found out.

The weight was maximum in control and it was reduced to 13.35%, 33.19% and 13.30% due to higher concentration of Vijay neem in first day and fourth day and sixth day of fifth instars and it was 7.43%, 25.53% and 13.12% due to higher concentration of Dichlorovos in first, third and sixth day of fifth instars (Table1). The ANOVA showed significant changes in larval weight of *Bombyx mori* in response to concentration of pesticides. The F value between pesticide is 2.16 and between larvae is 877.36 (Table1). It is seen that the larval weights reduced progressively as the concentration of pesticide is increased. It is obvious that the quality of mulberry leaves has predominating influence on the development of the worms.

This contension is supported by the literature on the influence of quality of mulberry leaves on the growth and development of silk worm, (Ito and Arai 1963; Radha et. al., 1978; Pillai and Jolly, 1985) It is therefore concluded that feeding of larvae with pesticides treated leaves had a negative response on silk worm in respect of growth. The impact of pesticide was greater at the beginning of larval stage (Table1).

EFFECT OF PESTICIDE ON SILK WORM LARVAL AND PUPAL DURATION

A significant increase in larval duration was observed at different dietary concentrations of pesticides (Dichlorovos and Vijay neem) as compared to control diet. Larval period was also extended with increase in concentration of pesticides in the feed. Larval period from control 19.10± 0.52days was extended to 20.38 ± 0.86days due to Dichlorovos at higher concentration0.0005% and 22.14 ± 0.65days due to Vijay neem at higher concentration 0.005%. (Table2).

A similar condition was noticed in the development of pupae also. The pupal period of control larvae (10.28±0.64days) was extended to 11.34±0.70days and 13.42±0.78days at higher concentrations of Dichlorovos and Vijay neem respectively.

The total development period of control worms was 29.38 days whereas it was 31.72 days in the case of larvae fed with Dichlorovos at a concentration of 0.0005% sprayed leaves and 35.56 days in the case of larvae fed with neem at a concentration of 0.005% sprayed leaves, Among the two pesticides Vijay neem had a more negative effect on the development of silk worm larvae. ANOVA showed significant changes in larval and pupal period of *Bombyx mori* in response to concentration of pesticides. The F value between pesticides is 37.08 and between larvae is 2587.93 (Table2).

Table 1: Effect of pesticides on larval weight of -silkworm bombyx mori (values per 10 larvae in gram)

Pesticide	Concentration of pesticide (%)	Larval weight									
		Mean weight of III instar larvae	% change over control	Mean weight of IV instar larvae	% change over control	Mean Weight of V instar larvae I day	% change over control	Mean Weight of V instar larvae IV day	% change over control	Mean Weight of V instar larvae VI day	% change over control
Control	-	1.37±0.12	-	5.17±0.16	-	9.29±0.42	-	22.44±1.12	-	32.32±1.39	-
DICHLOROVOS	0.0001	1.35±0.09	1.45	5.0±0.31	3.29	9.25±0.43	0.43	20.06±1.16	10.60	30.30±1.73	6.25
	0.0002	1.32±0.05	3.64	4.97±0.71	3.87	9.23±0.79	0.65	19.32±1.05	13.90	30.07±1.20	6.96
	0.0003	1.27±0.06	7.30	4.94±0.12	4.45	9.18±0.62	1.18	18.01±1.17	19.74	29.33±1.18	9.25
	0.0004	1.21±0.03	11.68	4.9±0.48	5.03	8.63±0.71	7.10	17.48±1.04	22.10	28.98±1.05	10.30
	0.0005	1.19±0.01	13.14	4.89±0.14	5.49	8.60±0.63	7.43	16.71±1.02	25.53	28.08±1.28	13.12
Vijay neem	0.001	1.30±0.08	5.11	4.98±0.41	3.68	9.02±0.84	2.91	20.00±1.12	10.87	30.19±1.71	6.59
	0.002	1.27±0.03	7.29	4.00±0.28	22.6	8.56±0.68	7.86	17.86±1.16	20.41	30.06±1.31	6.99
	0.003	1.10±0.07	19.71	3.98±0.61	23.01	8.52±0.92	8.29	17.30±1.10	22.91	29.10±1.17	9.96
	0.004	1.08±0.04	21.17	3.67±0.18	25.15	8.29±0.26	10.98	17.05±1.06	24.0	28.19±1.22	12.9

	0.005	1.00±0.02	27.00	3.50±0.34	32.30	8.05±0.79	13.35	14.99±1.04	33.19	28.02±1.12	13.30

F-table value with df (2,4) at 0.05 level is 6.94

F-table value with df (2,4) at 0.01 level is 18.00

Table 2: Effect of pesticide on larval and pupal period of Silkworm bombyx mori (mean ± sd) (n=100)

Pesticide	Concentration of pesticide (%)	Larval Period (days)	% Change over control	Pupal Period (days)	% Change over control	Total Developmental period (days)	Larval – Pupal index
Control	-	19.10±0.52	-	10.28±0.64	-	29.38	-
DICHLOROVOS	0.0001	19.13±0.25	(-0.15)	10.49±0.29	(-2.04)	29.62	1.008
	0.0002	19.92±0.36	(-4.65)	10.58±0.16	(-2.91)	30.57	1.040
	0.0003	20.12±0.47	(-5.34)	10.94±0.80	(-6.42)	31.06	1.057
	0.0004	20.24±0.56	(-5.96)	11.26±0.53	(-9.53)	31.50	1.072
	0.0005	20.38±0.86	(-6.70)	11.34±0. 70	(-10.31)	31.72	1.079
VIJAY NEEM	0.001	19.6±0.68	(-2.11)	10.94±0.72	(-6.42)	30.1	1.025
	0.002	19.90±0.57	(-4.18)	11.90±0.66	(-15.75)	31.8	1.082
	0.003	20.64±0.66	(-8.06)	12.12±0.16	(-17.89)	32.76	1.115
	0.004	21.33±0.40	(-11.67)	12.98±0.73	(-26.26)	34.31	1.168
	0.005	22.14±0.65	(-15.91)	13.44±0.78	(-35.60)	35.56	1.211

F-table value with df (2,2) at 0.05 level is 19.16 F-table value with df (1,2) at 0.05 level is 18.51

F-table value with df (2,2) at 0.01 level is 99.17 F-table value with df (1,2) at 0.01 level is 99.49

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