

EFFECT OF TWO AGRICULTURAL PESTICIDES ON MULBERRY  
SILKWORM *BOMBYX MORI* L.

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## ABSTRACT

Effect of two important agricultural pesticides viz., Cuprasol and Parasan-I on larval duration, fecundity, fertility and hatchability in mulberry silkworm *Bombyx mori* L. have been investigated. The chemicals at 250, 500 and 750mg/50/larvae were administered to III instar larvae by topical application method to multivoltine Pure Mysore and bivoltine Kalimpong-A races of silkworm *B. mori*. The results show that in Pure Mysore, both fecundity and hatchability were reduced significantly by both the chemicals. While in Kalimpong-A both the chemicals could bring reduction in fecundity only, indicating racial variation with regard to sensitivity limits to the chemicals. However, both the chemicals could not bring significant variation neither in larval duration nor in fertility.

Key words : Silkworm *Bombyx mori* L., Cuprasol, Parasan-I, fertility, fecundity, hatchability, larval duration.

## INTRODUCTION

Large number of pesticides are being produced and marketed for use in agriculture and relevant field for controlling and eradicating pests of various types in the interest of productivity, relevant to human health and welfare. Some of these are residual in nature and interfere with ecosystem directly or indirectly by their biodegradable products. Since man and animals are directly or indirectly exposed to these pesticides, a careful screening and evaluation of the somatic and genetic effects is of utmost need. Apart from routine test systems of *Drosophila*, mouse, bacteria and others, the silkworm *Bombyx mori* L. as a test object is also being employed to evaluate the toxicity of agricultural pesticides. In the present studies, a broad spectrum fungicide Cuprasol, which contains 88% copper oxychloride, manufactured by Solar Syndicate, Dungri, India and a carbamate fungicide, Parasan-I of Hyderabad Chemicals, Co. (P) Ltd., India, composed of phenyl mercury acetate with 1% Hg have been tested for their toxic effect in submammalian test system *B. mori*. Since Cuprasol is used as contact fungicide in the form of foliar spray and Parasan-I for seed dressing, the evaluation of these fungicides will be of relevance in understanding their role not merely in pest control but also in their involvement in ecosystem. Further, the present investigations also include the differential sensitivity of two races of *B. mori* to toxicity parameters of fecundity, fertility, hatchability and larval duration. The findings of these studies are herein presented.

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## MATERIALS AND METHODS

Two hundred healthy larvae of Pure Mysore (PM), a multivoltine race and Kalimpong-A (KA), a bivoltine race of silkworm *Bombyx mori* were reared separately upto 2nd moult with normal mulberry leaves as feed. When they entered III instar, the larvae of each race were divided into four groups of 50 larvae each. The chemicals were administered separately to the larvae by topical application method (Tazima 1978; Sugiyama and Sato 1980). 250 mg/50 (Conc. 1) larvae, 500 mg/50 larvae (Conc. 2) and 750 mg/50 larvae (Conc. 3) of the each of the chemicals was dissolved in acetone and painted on dorsal and ventral surfaces of the larvae. The larvae smeared with acetone alone were taken as controls. The larvae were allowed to continue their development with mulberry leaves as feed upto spinning stage. Further, moths obtained from the above groups were crossed to the moths of opposite sex obtained from same group and were allowed to lay eggs. These eggs were allowed to develop further and hatch into 'ants'. When hatching was completed, fecundity, fertility and hatchability were estimated. Apart from the above, larval duration was also noted in all the control and treated groups. Results obtained thereby were statistically analysed by ANOVA test.

## RESULTS

Table 1 incorporates the data on the effect of Cuprasol and Parasan-1 on larval duration, fecundity, fertility, hatchability etc., in PM and KA races of silkworm

TABLE 1  
Effect of cuprasol and parasan-1 in silkworm *Bombyx mori*

Chemical	Concentration	Larval Duration (Hr)	Fecundity	Fertility (%)	Hatchability (%)
<i>Race : Pure Mysore</i>					
Cuprasol	Control	600.0±24.2	438.4±8.2	96.0±1.5	95.3±1.4
	Conc. 1	597.5±26.2	401.3±3.2\$	95.0±2.4	81.1±3.2\$
	Conc. 2	600.0±24.1	386.4±8.3\$	96.7±2.4	76.0±3.8\$
	Conc. 3	600.0±24.2	354.0±16.0\$	95.3±4.2	74.0±2.7\$
Parasan-1	Conc. 1	600.0±19.0	406.±014.3\$	94.0±1.3	84.3±3.1\$
	Conc. 2	605.0±24.0	380.0±10.3\$	95.0±3.1	86.4±3.8\$
	Conc. 3	605.0±24.0	368.0±9.4\$	97.0±1.6	85.4±1.7\$
<i>Race : Kalimpong-A</i>					
Cuprasol	Control	549.5±26.6	541.3±9.6	98.1±1.1	97.2±1.3
	Conc. 1	566.5±28.6	526.0±8.6\$	98.6±1.3	96.3±3.2
	Conc. 2	566.5±28.6	504.0±7.4\$	93.4±3.4	95.4±1.2
	Conc. 3	566.5±28.6	496.0±6.5\$	95.5±2.6	96.4±2.3
Parasan-1	Conc. 1	559.5±24.0	530.0±4.4\$	97.3±2.3	96.7±1.4
	Conc. 2	559.5±24.0	520.7±3.2\$	96.4±1.2	94.0±2.3
	Conc. 3	559.5±24.0	502.3±4.2\$	95.3±2.3	95.3±1.6

\$ = Statistically significant ( $P < 0.005$ ) by ANOVA.

*B. mori*. The data reveals that both Cuprasol and Parasan-1 do not have significant effect on larval duration and fertility in both the races. However, the fecundity of PM race was reduced from  $438.4 \pm 8.2$  in control to  $401.3 \pm 3.2$  and in KA from  $406.0 \pm 16.0$  in control to  $368.0 \pm 9.4$  in highest concentration, which is significant at 0.005 level. Similarly, Parasan-1 also showed significant effect on the fecundity in both the races. Further, the hatchability of PM was reduced significantly in different doses of both Cuprasol and Parasan-1, while, their effect on hatchability was insignificant in KA.

#### DISCUSSION

Rate of development, fecundity, fertility and hatchability are some of the important parameters to evaluate toxicity of a chemical in animal test system (Luning 1966; Sankaranarayanan 1969; Sorsa and Pfeifer 1973 a,b; Akai *et al* 1978; Tazima 1978; Gayathri and Krishnamurthy 1979, 1980; Krishnamurthy *et al* 1984; Kuwano *et al* 1984). By using these parameters the toxicity of two agricultural pesticides, namely Cuprasol and Parasan-1 have been evaluated in silkworm *B. mori*. The studies show that both the chemicals are toxic with reference to fecundity in both the races. However, the chemicals have no effect on larval duration and fertility. The effect of the chemical also depends on the mode of administration (Kuwano *et al* 1967; Sugiyama *et al* 1969; Kido *et al* 1974; Sugiyama 1980 and Sugiyama and Sato 1980), dose etc., Since the topical application does not provide any idea regarding the quantity of the chemical that has entered into the test system, the increased dose may show significant effects. The differential effect of these two chemicals on hatchability in PM (significant) and KA (insignificant) indicate that the different genetic make up of the races have different sensitivity limits to the chemicals.

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