Ovicidal Effect of Cuprasol and Parasan-one in Different Races of Silkworm Bombyx Mori

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ABSTRACT

Effects of Cuprasol (88% copper oxychloride) and Parasan-One (Phenyl mercury acetate 1% Hg) on the silkworm eggs have been studied. Fresh eggs of six races of *Bombyx mori*, namely Pure Mysore, Hosa Mysore, C. nichi, NB_{18}, NB_4D_2 and Kalimpong-A were soaked in 50, 100, 200 and 400 ppm of each of these fungicides for 30 minutes, to test their effects on hatchability of eggs. Pure Mysore, Hosa Mysore and NB_4D_2 races were highly sensitive to Cuprasol whereas NB_4D_2 and NB_{18} were sensitive to Parasan-One.

Key words: Silkworm *Bombyx mori*, Parasan-One, Cuprasol, differential sensitivity.

Introduction

Two agricultural pesticides viz., Cuprasol (88% Copper oxychloride), a broad spectrum contact fungicide of organochlorine nature, being marketed by Solar Syndicate, Dungri, India, and Parason-One (Phenyl mercury acetate 1% Hg), a carbamate fungicide used as a seed dressing agent, which is being manufactured by Hyderabad Chemicals (P) Ltd., Hyderabad, India have been studied for their effects on hatchability in silkworm *Bombyx mori*. Though the earlier workers(1) have investigated the somatic and genetic effects of Ceresan, an analog of Parasan-One in *Drosophila melanogaster*, yet the information on silkworms is very much wanting because of the fact that pesticides of similar nature is widely being used in sericulture industry. So, a study was undertaken to assess the effects of the said pesticides on hatching in silkworms.

Materials and Methods

Three multivotine silkworm races namely Pure Mysore (PM), Hosa Mysore (HM) and C.nichi (CN) and three bivoltine races viz., NB_{18}, NB_4D_2 and Kalimpong-A(KA) of mulberry silkworm *Bombyx mori* available at Sericulture Research Project, Department of Studies in Zoology, University of Mysore, Manasagangotri, Mysore-570 006 formed the material for the present experiments. Newly emerged male and female moths of each of the above six races were separately mated for 3 hrs. Later, they were depaired and female moths were allowed to lay eggs on the egg cards. The eggs of same age (± 4 hrs) thus collected were subjected to chemical treatment. The treatment involved soaking the eggs in 50, 100, 200 and 400 ppm of each of the chemicals separately in distilled water for 30 minutes. Eggs of same age (± 4 hrs) soaked in distilled water for 30 minutes were taken as controls. Soon after the chemical treatment, the eggs were washed is distilled water and were dried in cool and dry place. Further, the bivoltine eggs were subjected for hot acid treatment to break the diapause artificially(2). Then, eggs were allowed to develop further. When all the 'ants' hatch out of the eggs, the unhatched eggs were counted and accounted for sensitivity to the chemical. The data obtained was statistically analysed by subjecting the data for analyses of variance.

Results

Table 1 incorporates the data on the effect of Cuprasol and Parasan-One in six races of silkworm *B.mori*. Treatment of eggs with Cuprasol in PM race, percentage of unhatched eggs increased gradually with the concentrations of the chemical used. Parasan-One caused no significant change in hatchability at the different concentrations tested indicating that the chemical has no effect on hatchability in the said race compared to control. Similar observations were made in HM race,

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where only Cuprasol reduced hatchability to a statistically significant level ($P < 0.005$). Further, Cuprasol caused a reduction in hatchability in NB_4D_2 race also. While Parasan-One could bring reduction in hatchability in NB_{18} and NB_4D_2 races only.

TABLE 1

Effect of Cuprasol and Parasan-One on the eggs of silkworm *Bombyx mori*

Race	CUPRASOL				PARASAN-ONE			
	Concentration (ppm)	Total No. of eggs	Unhatched eggs	% of unhatched	Concentration (ppm)	Total No. of eggs	Unhatched eggs	% of unhatched
Pure Mysore	Control	1613	278	17.23	Control	1613	278	17.23
	50	1621	320	19.85†	50	1408	205	14.55
	100	1297	311	23.97†	100	835	86	10.29
	200	1437	406	28.85†	200	1768	167	9.44
	400	1447	439	30.33†	400	2206	279	12.64
Hosa Mysore	Control	830	127	15.30	Control	830	127	15.30
	50	1238	248	20.02†	50	1002	294	29.34
	100	1080	286	25.92†	100	1040	315	30.28
	200	1012	387	38.24†	200	896	234	26.11
	400	934	553	59.30†	400	1079	277	25.67
NB_{18}	Control	1402	39	2.78	Control	1402	39	2.78
	50	566	26	4.59	50	1476	66	4.47†
	100	708	42	5.93	100	890	79	8.87†
	200	607	41	6.75	200	955	144	15.07†
	400	692	52	7.51	400	941	284	30.18†
NB_4D_2	Control	1310	82	6.25	Control	1310	82	6.25
	50	1059	66	6.28†	50	958	86	8.97
	100	984	260	26.12†	100	1008	251	24.90
	200	976	402	41.18†	200	1027	251	24.40†
	400	1138	568	49.91†	400	1033	279	27.00†
C.nichi	Control	480	35	7.29	Control	480	35	7.29
	50	930	120	12.96	50	1200	107	8.91
	100	908	108	11.89	100	1606	196	12.20
	200	847	75	8.85	200	1074	58	5.40
	400	1143	130	11.33	400	1046	102	9.75
Kalimpong-A	Control	1203	22	1.82	Control	1203	22	1.82
	50	819	59	7.20	50	1172	18	1.53
	100	998	81	8.11	100	797	94	11.59
	200	828	82	9.90	200	1143	15	1.31
	400	1321	131	9.91	400	1164	41	3.53

† = Statistically significant at 0.005 level by ANOVA.

Discussion

Hatchability is one of the important parameters to study the toxicity of a substrate in any test system. Reduction in hatchability is attributed to the effect of the chemical on the growing embryo (1 and 3). In the present studies, it is noted that silkworm races of Indian origin are sensitive to Cuprasol but resistant to Parasan-One indicating their differences in the genetic material, which responses differently to different chemicals.

All the bivoltines except NB_4D_2 did not show a significant reduction in hatchability when treated with Cuprasol. This may be because of the presence of Diazo genes in NB_4D_2 race.

The exotic races, C.nichi (Which is a hybrid between a Chinese and a Japanese race) and Kalimpong-A (a race with Chinese cocoon characters) are resistant to both the chemicals. Thus providing gene X environmental interaction in the expression of the characters.

Conclusion

With the present studies, it can be concluded that multivoltine races of Indian origin are sensitive to Cuprasol, while they are resistant to Parasan-One. The pure races of exotic origin are resistant to both the fungicides at the concentrations tested.

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