

SUSCEPTIBILITY OF TACHINID PARASITES *Eucelatoria bryani* SABROSKY AND *Carcelia illota* CURRAN TO DIFFERENT INSECTICIDES

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The susceptibility of exotic tachinid parasite *Eucelatoria bryani* Sabrosky and *Carcelia illota* Curran to thirteen insecticides was studied. Parasitoids were exposed at field recommended dose under laboratory conditions at $28 \pm 1.5^\circ\text{C}$ and 67.0 ± 7.5 RH. Phosalone (0.05%) and dicofol (0.05%) were found to be non-toxic to the adult tachinid flies. Carbaryl (0.10%) recorded 80% mortality of adults of *E. bryani* while other insecticides were highly toxic. Immature stages of both the parasites when sprayed with known concentration of insecticides, resulted high percentage of fly emergence in phosalone (0.05%) and dicofol (0.05%) and other insecticides were highly toxic.

Eucelatoria bryani Sabrosky, an exotic parasite (Brayan *et al.*, 1972) and earlier workers studied the biology of this tachinid (Jackson *et al.*, 1969), length and development period, longevity and fecundity (Mani and Nagar-kattir 1981) and *Carcelia illota* Curran, an indigenous parasite (Patel *et al.*, 1972) of *Heliothis armigera* are known to parasitise the late instar larvae. Hence, studies were made on the susceptibility of the parasites to different insecticides and to select the safe chemical to conserve the natural enemies and augmenting them.

MATERIALS AND METHODS

Cultures of *E. bryani* and *C. illota* on *H. armigera* were reared by adopting the method as described by Jackson *et al.*, (1969) and Nagaraja, (1979) under laboratory conditions at $28 \pm 1.5^\circ\text{C}$ and 67.0 ± 7.5 RH. One day old female parasites were used as test insects as suggested by Gaitonde (1978). Thirteen insecticides were tested in the laboratory which consist-

ed of carbaryl ((Sevin 50WP), quinalphos (Ekalux 25 EC), monocrotophos (Nuvacran 40 EC), dimethoate (Rogor 35 EC), malathion (Cythion 50 EC), phosalone (Zolone 35 EC), endosulfan (Thiodan 35 EC), chlorpyrifos (Corban 20 EC), methyl demeton (Metasystox 25 EC), dicofol (Kelthane 18.5 EC), dichlorvos (Nuvan 100 EC), phosphomidon (Dimecran 100 EC) and fenthion (Lebaycid 100 EC). Field recommended dose of each insecticides was diluted with water to get known concentration. To study the susceptibility of immature stages of the parasites spraying of the chemical was done when the maggot started forming puparia, the same was air dried and kept in petridishes for its fly emergence. Strips having sizes of 7.5 x 3.0 cm were dipped in pesticide solution and allowed to dry under shade for 15 minutes. A control was maintained by dipping the filter paper in water alone. After drying the filter paper the strip was kept in tachinid cages (12 x 12 x 8 cm) and ten adult parasites were introduced into the cage

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The adults were provided with sugar crystals and the open end was covered with muslin cloth to provide aeration. The parasites were exposed continuously for a period of 6 hrs and then transferred to untreated cages for 24 hrs as suggested by Gaitonde (1978). Mortality of the parasite was observed at 1, 2, 4, 6, 8, 12 during the exposure and then for 24 hrs, 48 hrs, 72 hrs

and 96 hrs following treatment. Each treatment was replicated thrice and with ten adult flies per replication.

Zero values in the percentage of mortality of the adult parasite were converted into 0.01 and data were transformed into corresponding angles ($\text{arc-sin}(\sqrt{\text{percentage}})$) for statistical analysis.

Table 1: Effect of different insecticides on the immature stages of *E. bryani* and *C. illota* (Figures in parentheses are arcsin transformed values)

Name of the chemical	% of concentration	Mean % fly emergence	
		<i>E. bryani</i>	<i>C. illota</i>
Carbaryl	0.10	21.6 (13.6)	0.00 (0.6)
Quinalphos	0.05	0.0 (0.6)	0.00 (0.6)
Monocrotophos	0.05	0.0 (0.6)	0.0 (0.6)
Dimethoate	0.05	0.0 (0.6)	0.0 (0.6)
Malathion	0.10	21.6 (13.6)	20.1 (26.6)
Phosalone	0.05	70.4 (57.0)	80.0 (63.4)
Endosulfan	0.07	20.1 (26.6)	0.0 (0.6)
Chlorpyrifos	0.05	0.0 (0.6)	0.0 (0.6)
Methyl demeton	0.05	0.0 (0.6)	0.0 (0.6)
Dicofol	0.05	80.0 (63.4)	70.4 (57.0)
Dichlorvos	0.10	0.0 (0.6)	0.0 (0.6)
Phosphamidon	0.10	0.0 (0.6)	0.0 (0.6)
Fenthion	0.05	0.0 (0.6)	0.0 (0.6)
Control		94.7 (76.7)	100.0 (90.0)
Comparison of treatments		SE	CD (P=0.05)
Between parasites		NS	NS
Between chemicals		4.34	8.9*
Interaction between Parasite Vs chemical		6.14	12.60

Table 2: Percentage of mortality of adults of *E. bryani* (Figures in parentheses are arcsin transformed values)

Pesticide	Concentration	Duration of exposure in hours									
		1	2	4	6	8	12	24	48	72	96
Carbaryl	0.10	0.0 (0.6)	0.0 (0.6)	23.3 (28.8)	33.3 (35.2)	53.4 (46.9)	59.9 (50.7)	63.5 (52.8)	70.1 (56.8)	80.0 (63.4)	80.0 (63.4)
Quinalphos	0.05	0.0 (0.6)	0.0 (0.6)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Monocrotophos	0.05	0.0 (0.6)	32.9 (35.0)	50.0 (45.9)	70.4 (57.0)	93.3 (75.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Dimethoate	0.05	26.6 (31.0)	53.4 (46.9)	70.4 (57.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Malathion	0.10	13.0 (21.1)	36.6 (37.2)	53.4 (46.9)	76.0 (61.2)	87.0 (68.9)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Phosalone	0.05	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.5)	0.0 (0.7)	0.0 (0.6)
Endosulfan	0.07	0.0 (0.6)	0.0 (0.6)	1.3 (6.5)	19.3 (26.1)	46.6 (43.1)	66.8 (54.8)	83.6 (66.1)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Methyl demeton	0.05	60.1 (50.8)	93.2 (74.9)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	102.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Decofol	0.05	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)
Dichlorvos	0.10	70.4 (57.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Phosphamidon	1.10	46.6 (43.0)	76.8 (61.2)	100.0 (90.0)	190.9 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (99.0)	100.0 (90.0)	100.0 (90.0)
Fenthion	0.05	73.9 (59.2)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Chlorpyrifos	0.05	76.8 (61.2)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Control	—	0.0 (0.6)	0.0 (0.6)	6.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)

Comparison of significance
 Between times 0.54
 Between chemicals 4.50
 Interaction between chemical and time 14.40
 CD (P±0.05) 1.15
 8.92
 28.22

Table 3: Effect of various pesticides on adults of *C. flitza*
(Figures in parentheses are arcsin transformed values)

Pesticides	Concentration	% mortality									
		Duration of exposure in hours									
		1	2	4	6	8	12	24	48	72	96
Carbaryl	0.10	0.0 (0.6)	0.0 (0.6)	5.5 (13.6)	29.5 (32.9)	40.0 (39.2)	70.5 (57.1)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Quinalphos	0.05	0.0 (0.6)	0.0 (0.6)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Monocrotophos	0.05	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Dimethoate	0.05	0.0 (0.6)	29.5 (32.9)	50.0 (45.0)	70.5 (57.1)	80.0 (63.4)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Malathion	0.10	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	5.5 (13.6)	29.5 (32.9)	70.5 (57.1)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Phosalone	0.05	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)
Chlorpyrifos	3.05	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Methyl dematon	0.05	50.0 (45.0)	50.1 (50.8)	100.0 (90.0)	100.0 (90.0)	10.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Endosulfan	0.07	0.0 (0.6)	0.0 (0.6)	5.5 (13.6)	40.0 (39.2)	50.0 (45.0)	70.5 (57.1)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Decofol	0.05	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)
Dichlorvos	0.10	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Phosphamidon	0.10	50.0 (45.0)	70.5 (57.1)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Fenthion	0.10	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)
Control		0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)	0.0 (0.6)

CD (P=0.05)

2.34
62.75
NS

Level of significance SE

1.03
26.91
NS

Comparison of Significance

Between Time
Between chemical
Interaction between chemical x time

ERRATA in TABLE-2: Printed as Phosalone Chlorpyrifos Read as Phosalone Chlorpyrifos
Printed as Decofol Central column 4 5.0 Read as Decofol 0.0

RESULTS AND DISCUSSION

Studies made on the contact toxicity of different insecticides to the immature stages (puparia) of *E. bryani* and *C. illota* indicated that phosalone (0.05%) and dicofol (0.05%) were found to be non-toxic while the other insecticides are highly toxic to the puparium and affected the total emergence of flies during the post treatment period which is in agreement with the findings of Mani and Nagarkatti (1983) on *Bracon kirpatricki*, Wilkinson and *Apanteles anageleti* Museback (Table 1)

The susceptibility of the adults of *E. bryani* and *C. illota* to different insecticides differed significantly (Table 2). Among the insecticides, tested, phosalone (0.05%) had no adverse effect on this parasitoid and carbaryl (0.10%) was found to be less toxic than the other insecticides. Endosulan recorded 1.3% mortality of *E. bryani* upto 4 hrs of exposure and no mortality of *C. illota* was observed upto 4 hrs of exposure while malathion, quinalphos, chlorpyrifos, methyl demeton, dichlorvas phosphamidon and fenthion caused 100% mortality of these two parasites after 4 hrs of exposure. Carbaryl and endosulan resulted 63.5% and 83.6% mortality of *E. bryani* after 24 hrs of exposure. The non toxic nature of phosalone and dicofol to several natural enemies was also reported by Lelièvre (1980). The harmful effect of methyl demeton, chlorpyrifos, monocrotophos, dichlorvos and fenthion to the parasites

is in accordance with the findings of Bartlett (1966).

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