

Evaluation of ethofenprox on *Chrysopa madestes* (Neuroptera: Chrysopidae)- a serious pest of Indian lac insect, *Kerria lacca* (Kerr.)

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ABSTRACT

Studies on the effect of different concentrations of ethofenprox on *Chrysopa madestes*, a serious predator of *kusmi* strain of lac insect revealed that 0.02% concentration was found to be most suitable for protecting the lac crop at critical stage against *C. madestes* under field conditions.

Most of the Chrysopids are useful as they destroy numerous harmful insects such as aphids, Coccids, plant lice and mites etc. However, *Chrysopa madestes* Banks is harmful to lac insect, *Kerria lacca* (Kerr.). Its larvae suck the body fluids from different stages of lac insect with the help of large pincers. The *C. madestes* is able to destroy the whole crop, specially *kusmi* lac culture. The first, second and third instar larvae of this species can destroy upto 20, 24 and 74 mature females of lac insect per day (Mehra, 1965). The adults of predator are attracted toward the lac culture possibly due to honeydew secreted by the lac insect.

The first instar larvae of *C. madestes* attack mainly *kusmi* lac culture as soon as lac insect settlement is over on tender shoots of host tree which correspond to 25-30 days after inoculation for winter crop, some times in August-September and 30-35 days for summer crop, sometimes in March-April. Hand picking and shaking of the branches with lac insect settlement are simple methods to do away with the predator but difficult for adoption on large scale, in view of large tree size and in process repeated climbing on different branches of host tree and damage to lac culture. BHC/chlordane (Chaudhary, 1983) and dichlorvos (Mishra *et al.*, 1996) were recommended for the control. Dichlorvos is not suitable at early stage of lac insect development (<45 days of inoculation) as it causes mortality of lac insect at recommended dose of 0.03%. A dose of less than 0.03% is not much effective (39-59% mortality) to control this species (Mishra *et al.*, 1996). In view of this, ethofenprox a non-ester pyrethroid, molecule falls under the category of GRAS (generally recognized as safe),

with quick knock-down action, and detrimental to lepidopteran predators (Jaiswal *et al.*, 2004), was evaluated against *Chrysopa madestes*.

MATERIALS AND METHODS

First, second and third instar larvae of the predators' were collected from lac culture area of lac infested *Schleichera oleosa* (*kusum*) and *Ziziphus mauritiana* (*ber*) trees in the month of August and were treated with four concentrations 0.05, 0.01, 0.02, 0.03 of ethofenprox. Twenty larvae were treated with each concentration in four replications of five each. The formulations were topically applied with the help of atomizer. The treated larvae were transferred in glass petridishes and offered living lac insect settled twigs for feeding. The observation on mortality was taken four hours of treatment. The moribund larvae were considered dead. The controls were treated with water only. Field application of 0.02% ethofenprox was also carried out on winter season crop of *kusmi* lac on trees of *Z. mauritiana* and *S.oleosa* at 25-30 days after inoculation in the month of August, when incidence of this predators were observed substantially higher in farmers field, at Putidih village in Jhalda block of Purulia district (West Bengal).

RESULTS AND DISCUSSION

Data presented in table-1, revealed that lower concentration of ethofenprox *viz.* 0.005% was effective on 1st and 2nd instar larvae of the predator and caused 70 and 30% mortality respectively. The next higher concentration tried in the present study *viz.* 0.01% showed 100, 84, and 70% mortality to 1st, 2nd, and 3rd instar respectively indicating more

Table 1. Bioefficacy of ethofenprox on *Chrysopa madestes*.

Concentration (%)	Total no. of larvae tested	Average mortality		
		I st instar	II nd instar	III rd instar
0.005	20	3.5 (70)	1.5 (30)	0
0.01	20	5 (100)	4.2 (84)	3.5 (70)
0.02	20	5 (100)	5 (100)	5 (100)
0.03	20	5 (100)	5 (100)	5 (100)
Control	20	0	0	0
SEm ±		0.13	0.18	0.22
CD at 5%		0.38	0.53	0.66

Figures in parentheses are in percentage

susceptibility of earlier instar, may be due to small size. A concentration of 0.02%, was capable of causing cent per cent mortality to all stages of the predator. Later on the moribund larvae also died. Leaving even a smaller population of this predator is harmful, besides devouring large population lac insect (voracious feeder), its cycle will continue and next generation will also harm lac insect population. Moreover, there is long critical period in lac insect development when application of chemical insecticide is restricted. This period pertains to 3-4 days prior to male emergence upto completion of adult male emergence. Hence a dose of 0.02% is most suitable dose for management of *C. madestes* as it also do not harm lac culture. The safety of ethofenprox against lac insect culture has been already established upto 0.04% by field application (Jaiswal *et al.*, 2004) and also by dipping brood lac (Bhattacharya *et al.*, 2005). A concentration of 0.01% has been found effective for management of two lepidopteran pest of lac, the *Eublemma amabilis* and *Pseudohypatopa pulverea* under field application trial on rainy season crop of *rangeeni* lac culture, developing on *Butea monosperma* (Jaiswal *et al.*, 2004). Since *C. madestes* is sporadic in nature and its incidence is more pronounced on *kusmi* lac, a concentration of 0.02% is recommended if incidence of *C. madestes* is seen on lac culture. Ethofenprox has some advantages over other recommended pesticides in lac culture. First, it can be applied even at a very early stage of lac insect development (25 days after inoculation) Second, effective against all three major insect predators *viz.* *Chrysopa* spp, *E. amabilis* and *P. pulverea*, third, a bit higher dose, 0.04% is also safe for lac insect and fourth, the quick knock-down effect more suited during rainy season. The toxicity of ethofenprox towards the first instar

larvae of *Chrysoperla carnea* has been established earlier by Toda and Kashio (1997).

The field evaluation of 0.02% concentration of ethofenprox in *Chrysopa* infested lac culture area, clearly showed quick knock down effect of its different larval stages. The moribund larvae fell on ground in large number and most of them are taken away by ants. As per feed back received from lac cultivators, protection of lac crop by application of 0.02% ethofenprox at the critical period provides assured lac production in *C. madestes* infested area.

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