

## Impact of Herbicides on *Pareuchaetes pseudoinsulata* and their Compatibility for Integrated Control of *Chromolaena odorata*

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*Chromolaena odorata* (L.) King and Robinson, a plant of Neotropical origin is considered as a serious weed of plantation crops, forests and grazing lands of South Asian and African countries, including India (Holms *et al.*, 1977). Field releases of the exotic host-specific biological control agent *Pareuchaetes pseudoinsulata* Rego Barros (Lepidoptera : Arctiidae) in different parts of South India, resulted in only localised defoliation (Jayanth and Ganga Visalakshy, 1993), necessitating manual and chemical methods even in areas where the insects were released. A study on the effect of herbicides on the insect was made under laboratory conditions, to see if both can be integrated.

The toxic and behavioural effects of the recommended dosage of the herbicide mixture, 2, 4D + paraquat (0.75 l + 1.5 l/700 l of water) (Mathew *et al.*, 1977) on the egg, larvae, pupae and adults were observed. *C.odorata* leaves with eggs of *P.pseudoinsulata* were given a thin uniform spray with a chromatographic sprayer and kept in Petri plates (10 cm) for hatching. Larvae exposed to the sprayed leaves for 6 h were kept in aerated plastic jars (10 x 7 cm) containing fresh unsprayed twigs. Observation on the mortality of larvae was made after 24, 48 and 72 h of exposure. Pupae given a uniform spray of the weedicides were kept in aerated plastic jars (10 x 7 cm) with moist cotton at bottom for adult emergence. Eggs and pupae, treated with tap water and larvae exposed to bouquets sprayed with tap water were run parallel to other treatments as control. The experiment was replicated four times with 100 eggs, 20-25 larvae and 10 pupae per replication.

To observe the dispersal behaviour, third instar larvae were released into a flat-bottomed glass jar (25 x 10 cm), in which herbicide-treated bouquets along with untreated ones were kept. The mouth of the jar was covered over by a muslin cloth held by rubber band. The experiment was replicated thrice with 10 larvae per replication. Observations on feeding and dispersal of larvae were made at 6, 24 and 48 h after exposure. The results were analysed using t test.

The oviposition behaviour was studied by releasing freshly-emerged adults into a oviposition cage, in which sprayed and unsprayed bouquets were kept. The oviposition cage (30 x 30 x 30 cm) had wire mesh on three sides and top with a sliding glass front. The wooden base was flanked by a moist sponge for humidity and a cotton swab dipped in 50% honey as food was hung. Observations on the number of eggs laid on treated and untreated bouquets were made every 24h till all the adults were dead. The experiment was replicated thrice, with three pairs per replication. The results were analysed using t test.

The results of the experiments showed that the herbicides were totally safe to the eggs, larvae and pupae causing only 0, 2 and 5% mortality respectively, which were insignificant and at par with control. No antifeedant or repellent behaviour was seen in larvae. However, more number of larvae were found to congregate on untreated twigs with increase in time of exposure (Table 1). Adults were found to prefer unsprayed leaves for oviposition.

The above observations show that 2, 4D and paraquat are relatively non-toxic to the insect and could be recommended for in-

**Table 1.** Effect of the weedicide-mixture on the dispersal behaviour of *P.pseudoinsulata* larvae and adults

Treatment	Per cent larvae found after h. of exposure			No. of eggs/female
	6	24	48	
Control	46.66	63.33	80.00	264
2, 4D + paraquat	43.33	33.33	20.00	36
Level of significance	NS	0.01	0.01	0.01

NS. Non-Significant

tegrated control of *C. odorata*. The relatively non-toxic nature of 2, 4D has been reported by Trumble and Kok (1980) and McCaffery and Callihan (1988) in *Ceuthorhynchidius horridus*, *Urophora affinis* and *U. quadrifasciata*.

The herbicides though non-toxic in nature could be detrimental to the population build up of insects, due to the sudden loss of habitat as reported by Hilsenhoff (1966) and Marshal and Rutschky (1974). Studies by Stoyer and Kok (1987), Stoyer *et al.* and Haag (1986a) on potential weed insects revealed that timing and patterns of herbicide application also forms important components of integrated control of weeds. The dispersal and oviposition studies show that larvae and adults prefer unsprayed leaves. Hence, it may be advisable to spray selected weed mats and herd the insects to unsprayed areas as suggested by Haag (1986b). This in addition to preventing undue mortality of insects due to sudden loss of habitat could also accelerate biological control in areas where spraying is not feasible.

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**KEY WORDS :** *Pareuchaetes pseudoinsulata*, *Chromolaena odorata*, herbicides, toxic and behavioural effects

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