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A Method to store Larvae of *Pareuchaetes pseudoinsulata* Rego Barros (Lepidoptera : Arctiidae), a Potential Biocontrol Agent of *Chromolaena odorata* (Compositae), Under Low Temperature

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The perennial compositae plant *Chromolaena odorata* (L.) R.M. King and H. Robinson, native to West Indies and South America, is a serious weed of plantation crops in southern Asia including India and Western Africa, (Holm *et al.*, 1977; Bennett and Rao, 1968). *Pareuchaetes pseudoinsulata* Rego Barros (Lepidoptera : Arctiidae), determined initially as *Ammalo insulata* (Walker), is one of the natural enemies recommended for introduction into India and other countries (Bennet and Crutwell, 1973). Introduction of this insect from Sri Lanka in 1985 has resulted in successful establishment in Kerala (Joy *et al.*, 1985).

Since *C. odorata* dries up during summer in most of the area where releases are in progress, availability of adequate numbers of insects is a crucial factor in colonizing the insect as soon as the weed germinates with the onset of monsoon. Taking into consideration the difficulty in maintaining large populations of *P. pseudoinsulata* during summer due to shortage of leaves of *C. odorata* and the unsuitability of the egg and pupal stages for storage, as observed in preliminary trials, attempts were made to prolong the larval life by storing them with food at 10, 15 and 20°C to determine the optimum temperature and the maximum number of days the larvae can be stored without adversely affecting the survival and reproduction.

Freshly hatched, laboratory-bred larvae of *P. pseudoinsulata* were released at the rate of 10 per clear plastic jar (14 x 11 cm) with wire-mesh window on the lid for aeration. A bouquet of *C. odorata* twigs was placed in each jar with the lower ends dipping in water in a small plastic container. The experiment was carried out in a B.O.D. incubator with a 20w fluorescent bulb connected to a timer providing 14 hrs light inside. At each temperature, larvae were stored for 15,30,45,60,75 and 90 days respectively. Five replications were maintained for each treatment. Fresh leaves were provided and the jars were cleaned every 7-10 days based on food consumption. Larvae after storage were reared at room temperature (28.94 ± 1.47°C) and humidity (74± 6% R.H.) and observations were recorded on storage and post-storage larval mortality, pupation, adult emergence, fecundity and egg viability. Five pairs of adults were used for observations on the last two parameters. Larvae reared at room temperature served as control.

The results showed that 15°C is the most suitable temperature for storing larvae of *P. pseudoinsulata* (Table 1). It was possible to prolong larval life upto 75 days although 45 days was found to be the most suitable. Storage was not possible for more than 75 days as all the larvae pupated inside the B.O.D. incubator itself by the 90 th day. Results obtained after storage of larvae for 15 days were comparable to that of control except for a marginal reduction in percentage of pupation. An increase in storage mortality ranging from 18-20% and a resultant reduction in percentage pupation was observed when larvae were stored for 30-60 days. Storage for 30 and 45 days did not significantly affect adult emergence, fecundity and percentage of egg hatching as compared with control.

A reduction in percentage of egg hatching was observed with increase in the duration of storage over 45 days. After 60 and 75 days of storage, only 50.61 and 24.06 per cent of eggs hatched when compared with 85.51% hatching after 45 days. A comparison of post-storage larval durations showed that after 60 and 75 days of storage, the insect pupated in 5.69 and 3.88 days respectively, indicating that they are in the final instar. However, larvae stored for 45 days required 13.27 more days for pupation. At 20°C, prolongation of larval life was possible for 30 days. Storage of larvae beyond this period resulted in 100% pupation inside the B.O.D. incubator. However, storage for up to 30 days at 20°C did not significantly affect any of the parameters of survival and reproduction. But larvae stored for 30 days at 20°C pupated

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Table 1. Effect of storage of larvae of *P. pseudoinsulata* at different temperature

Temperature	Days stored	% storage Mortality	% Post-storage larval Mortality	Post storage Larval Duration	Total Larval period	% Pupation	Sex-ratio Male : Female	% Adult Emergence	Fecundity eggs/Female	% Hatching
10°C	15	0	10	21.64	36.64	90	1:1.36	64.44	152.00	67.76
	30	78	16	24.33	54.33	6	1:2	33.33	-	-
	45	100	-	-	-	-	-	-	-	-
	60	100	-	-	-	-	-	-	-	-
	75	100	-	-	-	-	-	-	-	-
	90	100	-	-	-	-	-	-	-	-
15°C	15	6	10	19.82	34.82	84	1:1.21	80.95	313.20	95.10
	30	20	10	15.65	45.65	70	1:1.33	88.89	335.33	87.97
	45	20	6	13.27	58.27	74	1:0.95	83.78	332.50	85.51
	60	18	12	5.69	65.69	70	1:1.05	88.57	309.25	50.61
	75	24	22	3.88	78.33	54	1:1.25	85.19	223.00	24.06
	90	*	-	-	-	-	-	-	-	-
20°C	15	0	14	15.72	30.72	86	1:1.04	90.70	311.00	94.92
	30	0	12	5.20	35.20	88	1:1.32	81.82	321.00	93.40
	45	*	-	-	-	-	-	-	-	-
	60	*	-	-	-	-	-	-	-	-
	75	*	-	-	-	-	-	-	-	-
	90	*	-	-	-	-	-	-	-	-
Control	-	-	4	20.13	20.13	96	110.85	87.50	326.40	95.03

Means of 5 replicates of 10 larvae each * All larvae pupated while in storage

5.20 days after release, whereas at 15°C, pupation was obtained only after 15.65 days. Therefore, it is more advantageous to store larvae at 15°C as those stored at 20°C consumed more food and developed faster. It was not possible to store larvae of *P. pseudoinsulata* at 10°C as 75% of them died by the 30th day and 100% by the 45th day. Besides, storage at this temperature for even 15 days was found to significantly reduce the adult fecundity.

This study has shown that larvae of *P. pseudoinsulata* can safely be stored at 15°C for up to 45 days by providing fresh leaves of *C. odorata* at 7-10 days intervals. This method can be used for accumulating large number of larvae during the off-season for carrying out field releases against *C. odorata* as soon as it emerges after rains. The insect may thus be able to increase in sufficient numbers to exert some degree of control during the favourable period which in turn will enhance the chances of the insect finding suitable habitats for overcoming the dry period. This method will also make it possible to carry out multiplication of *P. pseudoinsulata* in laboratories which are situated far away from actual release sites.

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