

A CASE STUDY

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# Study the mass culture, biology and predatory potential of Australian Lady Bird Beetle, *Cryptolaemus montrouzieri* Mulstant (Coccinellidae: Coleoptera)

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## ABSTRACT

An experiment was conducted to study the mass culture, biology and predatory potential of Australian lady bird beetle, *Cryptolaemus montrouzieri* on pink mealy bug, *Maconellicoccus hirsutus*. Predatory potential and development period of *C. montrouzieri* grub was studied on the adult mealybug and the duration of first, second third and fourth instar of *C. montrouzieri* was found to be 3.10, 4.20, 4.60 and 7.60 days, respectively when they were fed with *M. hirsutus*. The predator completed its grub development in 19.50 days on mealybug. The mean number of mealybug adult consumed during first, second, third and fourth grub instar of *C. montrouzieri* averaged to 24.20, 28.38, 44.04 and 90.52, respectively. The results revealed that this predator feeds voraciously on adult mealybug. *C. montrouzieri* having a remarkable predatory potential can be used to reduce population of mealybug which will result in increasing the yield of crops.

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## INTRODUCTION

*Cryptolaemus montrouzieri* a generalist predator of several economically important mealybug species (Kamala *et al.*, 2010) is well-known classical biological control agents that have been introduced in to several countries (Solangi *et al.*, 2012). In India the coccinellid, *C. montrouzieri* has provided control against mealybugs and some soft scales (Mani and Krishnamoorthy, 2000). Mealybugs attack growing parts, main stems and

branches. Growing parts become bunchy and affected plants remain underdeveloped producing fewer flowers and fewer bolls of a smaller size and followed by black sooty mold grows on parts that are mostly visited by mealybugs. It is extremely difficult to control mealy bugs due to the presence of waxy skin. Biological control is one of the effective means of achieving insect control. The present study was therefore, carried out to know the mass culture, biology and predation potential of *C.*

*montrouzieri* on pink mealy bug, *M. hirsutus*.

## MATERIAL AND METHODS

Experiment was carried out in the Department of Agricultural Entomology, Vanavarayar Institute of Agriculture, Pollachi during 2011-2012.

### Mass culturing of Australian lady bird beetle, *Cryptolaemus montrouzieri* :

Predator was reared on mealy bug infested ripe pumpkin fruits in the laboratory by standardized technique (Chacko *et al.*, 1978 and Singh, 1978). The host insect, *Maconellicoccus hirsutus* was used for mass culturing of *C. montrouzieri* because of its shorter life cycle, higher fecundity and suitability as host for fast multiplication. Mealybug infested ripe pumpkin was exposed to the mated beetles for a period of 15 days after the initial infestation by the crawlers. The nucleus culture of *C. montrouzieri* was obtained from Tamil Nadu Agricultural University, Coimbatore. These were maintained in the breeding cage (about 100 beetles/cage). Mealybug infested ripe pumpkin after exposure to beetles was kept back in the predation chamber and the breeding continued. At the bottom of the cage dried leaves were kept to facilitate pupation of grubs.

### Mass culturing of Pink mealybug, *Maconellicoccus hirsutus* :

Culture of mealybug was done using the red pumpkin. Unripened pumpkin fruits, weighing 2-3 kg with ridges and grooves with a small stock were easy to handle in the culture work. To prevent rotting, fruits were treated with either Wettable sulphur (2g) or formaldehyde (0.1%) and shade dried.

### Culture chamber :

Initially the mealybugs were collected from infested crops in the fields and pure culture was maintained in the infestation chamber. A chamber having the front door and fixed plywood on the other three sides and bottom was used. A healthy pumpkin was kept on a plastic stand, inside the culture chamber after the fungicidal treatment, the wounds on the fruit if any, were plugged with wax and ends of the fruits were smeared with molten wax to avoid crushing of mealybug while handling. Approximately, fifty ovisacs were placed on a fruit. 5-7 days later crawlers emerged actively and settled on the

fruits. Crawlers were removed from mother culture a monthly intervals using tender glyricidia and crawlers settled on the leaves were transformed of new fruit.

### Biology of *C. montrouzieri* :

Biology of *C. montrouzieri* was studied on *M. hirsutus*. Eggs of coccinellid were obtained from the beetles reared on mealybugs. Four sets of forty eggs of grubs were kept individually in plastic box and the incubation period was recorded. After hatching the predatory larvae were fed only with the mealybug adults (till pupation). Observations were recorded and development period of different larvae instars (by checking the moulted skins daily) and pupal period.

### Predatory Potential of *C. montrouzieri* :

Laboratory experiments were conducted with 40 coccinellid grubs where each grub was considered as one replicate to determine the rate of consumption of adult mealybugs. Similarly predatory grubs of similar age were also maintained simultaneously for another three sets (plastic box) provided with host insects as for the treatment planned. Observations were recorded at every 24 hours interval and surviving host insects were counted and removed. Fresh host insects were offered to the predatory grub until pupation. Number of host insects consumed by the coccinellid grub in each instar and also the total number consumed in its grub development were calculated. Plastic boxes were cleaned daily to avoid insanitation to the coccinellid and the host insect. Mealybug population was maintained in each plastic box every day, as per the treatment.

## RESULTS AND DISCUSSION

The results revealed that the mean number of adult mealybugs preyed by different grub instars of *Cryptolaemus montrouzieri* is presented in Table 1. The number of adult mealybugs consumed by the first, second, third and fourth instar of *C. montrouzieri* averaged to 24.20, 28.38, 44.04 and 90.52, respectively. Prey consumption had increased with increase in the age of *C. montrouzieri* grub. Among them fourth instar grub was more voracious, consuming 90.52 adult mealybug in its development. The development period of first, second, third and fourth instars grub of *C. montrouzieri* was 3.1, 4.2, 4.6 and 7.6 days, and the pre-pupal and pupal period of *C. montrouzieri* was 2.5 and 8.9 days,

**Table 1: Predatory Potential of *C. montrouzieri***

Sr. No	Prey species	Mean no. of mealybugs consumed/grub				Total	Per day consumption
		I	II	III	IV		
1.	<i>M. hirsutus</i>	24.20 (4.91)	28.38 (5.32)	44.04 (6.63)	90.52 (9.51)	187.14	46.78

Represents pooled data of 4 sets of experiments and values are means of 40 replications  
Figures in parentheses are square root transformation.

**Table 2: Biology of *C. montrouzieri***

Development period	Days
Egg period	2.90 (1.70)
Grub period	
I instar	3.10 (1.76)
II Instar	4.20 (2.04)
III instar	4.60 (2.14)
IV instar	7.60 (2.75)
Total grub period	19.50
Pupal period	8.90 (2.98)
Adult	31.30 (5.59)

Represents pooled data of 4 sets of experiments and values are means of 40 replications  
Figures in parentheses are square root transformation

respectively. *C. montrouzieri* took an average of 31 days to complete its development (egg to adult) on the mealybugs is presented in Table 2.

Results of present investigations were in accordance with the findings of (Rosas-garcia *et al.*, 2009 and Mani and Thontadarya, 1987) who proved that the fourth instar grub consumed a maximum number an average 93.40 and 98.75 of mealybug adults. The total larval period and pupal period are also in line with (Liotta and Mineo, 1965 and Tirumala Rao and David, 1985) reported the grub period of *C. montrouzieri* (12-17 days) on *M. hirsutus* and the pre-pupal and pupal period of *C. montrouzieri* were 2-3 days and 7-9 days, respectively on *M. hirsutus*. These findings correlates with the work of (Kario *et al.*, 2002) reported that *C. montrouzieri* is a best biological control agent for hibiscus mealybug, *M. hirsutus*.

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