

# Impact of Temperature Regimes on the Growth and Development of *Cryptolaemus montrouzieri* on *Planococcus citri* in Guava

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## ABSTRACT

Under laboratory condition the developmental periods of *Cryptolaemus montrouzieri* was reduced to an extent of 22.7 days at 35°C when fed with *Planococcus citri* while it was maximum (39.0 days) at 20°C. The adult longevity ranged from 47.4 to 51.2 days at 25°C and was less (37.6 days) at 35°C for both the sexes. The number of eggs laid per female (328.5) and feeding potential (182.6 nos) were maximum at 30°C than at 20°C and 35°C.

**Keywords:** *Cryptolaemus montrouzieri*, *Planococcus citri*, Temperature, Growth and development.

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## INTRODUCTION

Guava trees are attacked by about 80 species of insects, of which fruit flies (*Bactrocera dorsalis* Hend), coccoids (*Chloropulvinaria psidii* Mask) and, castor capsule borer (*Conogethes punctiferalis* Guen) are of major importance. In recent years, the mealybugs, *Planococcus citri* Risso and *Ferrisia virgate* Ckll. have become serious pests of guava by attacking the foliage and fruits (Chattopadhyay, 2003). Temperature is a crucial factor, which influences the bio-attributes of predacious coccinellids; being a major determinant factor on the survival and development of immature stages and reproductive performance. The study has been formulated to know the influence of temperature on coccinellids.

## MATERIALS AND METHODS

To determine the most optimum temperature for the development of *C. montrouzieri*, petri dishes containing egg batches (20 nos./ batch) were kept in B.O.D incubator at four temperature regimes viz, 20, 25, 30, and 35°C. The incubation period was determined in terms of days. The newly emerged grubs (20 nos) from each temperature regime were taken in glass vials of 5 cm length and covered with black muslin cloth. The colonies of mealybugs, *P. citri* were introduced into the vials with predator grubs and then closed and observations on the pupal period, longevity of male and female in each temperature were recorded. The emerged females were collected from the stock culture and kept individually with one male for copulation for 24 hours. Later the females were separated, placed individually in petridishes containing mealybugs and kept in two temperature levels viz, 20°C and 30°C. The total number of eggs laid by each female was counted every day and the females were removed to fresh petriplates containing fresh colonies of mealybugs with ten replications and fecundity was recorded.

## RESULTS AND DISCUSSION

Data presented in Table 1 revealed that the developmental periods egg, larval, pre pupal and pupal stages with a total life

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span of 22.7 days was 3.4, 13.1, 1.6, and 4.6 days respectively, when exposed to 35°C. On other temperature levels viz., 20, 25 and 30°C the developmental period was prolonged to an extent of 39.0, 34.4 and 28.2, respectively. At all the temperatures, the total life span varied significantly different with each other. The males survived for 47.4 days while for the females it was 51.2 days when exposed to 25°C (Veeravel and Baskaran, 1996).

In general, the female survived for more days compared to males at all the temperatures tested. Among the two levels, it was observed that when they were exposed at 30°C, it laid maximum eggs, 328.5 nos. (Veeravel and Baskaran, 1996) than at 20°C (319.8 nos.) in its life time. The maximum feeding of the grubs (73.7 nos) was noted at 30°C and the feeding potential was greatly reduced when exposed to 35°C (63.9 nos). At all the temperatures, the fourth instar grubs fed a larger quantity (162.6 to 182.6 nos.) compared to the other stages. The total developmental period of the *C. montrouzieri* varied significantly when exposed to different temperature regimes of 20°C, 25°C, 30°C and 35°C.

**Table 1:** Temperature regimes on the development of *Cryptolaemus montrouzieri*

Stages	Temperature levels* (°C)			
	20°	25°	30°	35°
Egg	7.4e	6.2c	4b	3.4b
Grub I instar	5.6b	5.2b	4.4b	3.6b
II instar	3.6a	2.6a	2.2a	1.6a
III instar	5.6b	4.8b	4.4b	3.7b
IV instar	6.4c	6.0c	5.0c	4.2c
Total Grub period	21.2f	18.6e	16e	13.1e
Prepupa	3.2a	2.4a	2.2a	1.6a
Pupa	7.2d	7.2d	6d	4.6d
Total developmental period	39.0g	34.4f	28.2f	22.7f

\*Mean of five replications

In a column/row means followed by the same small letter(s) are not significantly different by DMRT ( $p=0.05$ )

The optimum temperature required for the development of *C. montrouzieri* was 30°C. The decrease in egg period with increase in temperature may be attributed to the accelerated embryogenesis, which probably caused early hatching of neonate instars. The decreased larval period of *C. montrouzieri* with increase in temperature may be attributed to the increased metabolic rates which lead to early completion of the larval period. Studies on the *C. montrouzieri* with reference to different temperature proved that 25°C was the favourable temperature as the longevity of male and female was extended up to 47.4 and 51.2 days, respectively. It is also inferred that females survived for a longer period than males.

The decreased survival rate at high temperature would have been detrimental to the adults of *C. montrouzieri*. So, the present findings suggested the release of *C. montrouzieri* adults @ 30°C might be favourable for the better establishment under field condition to reduce mealybug population was also revealed by Babu and Azam (1988). Thus, it is inferred that an optimum temperature of 30°C was found to be highly conducive for the

field establishment of *C. montrouzieri* and might be favourable for mass culturing also.

## CONCLUSION

An optimum temperature of 30°C favours the field establishment of *C. montrouzieri* and mass culturing also.

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