



*Rec. zool. Surv. India* : 106(Part-2) : 61-65, 2006

## LIFE CYCLE OF *TETRANYCHUS NEOCALEDONICUS* ANDRE ON *RHIZOPHORA MUCRONATA* LAMK, UNDER LABORATORY CONDITION AT CONTROLLED TEMPERATURE

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### INTRODUCTION

Sundarbans Biosphere Reserve (SBR) is very rich with mangrove vegetation. During the present study, *Tetranychus neocaledonicus* Andre was found infesting mangrove as well as agri-horticultural vegetation. Infestation of this mite may cause serious yield loss. Unfortunately, no study has been made in India to work out its biology and duration of different developmental stages on mangrove plants. Hence an attempt has been made in this study to work out the duration of different developmental stages, longevity, fecundity, sex-ratio, etc on a mangrove plant viz. *Rhizophora mucronata* Lamk. The results thereof are presented in this paper.

### MATERIAL AND METHODS

The life cycle of an important phytophagous mite, *Tetranychus neocaledonicus* Andre was studied on a mangrove plant *Rhizophora mucronata* Lamk. at controlled temperature ( $30 \pm 1^\circ\text{C}$ ) in the laboratory. The leaf-disc technique was followed (Lal, 1977). The excised leaf of *Rhizophora mucronata* was kept on wet cotton swab in a Petridish of 5 cm diameter.

The cotton swab was always kept supersaturated with water to prevent escape of mites. The excised leaf of *Rhizophora* was kept on cotton swab ventral surface upward. About ten females collected from field were released on the leaf kept on the wet cotton swab and the females were allowed to lay eggs. Next morning the eggs were counted, marked and after that the females were removed leaving only the eggs. The eggs were kept as such till they hatched into larvae. After hatching, each larva was transferred on individual Petridish and for each stage at least 10 replications

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were maintained enabling the data to analyse statistically. Observations were recorded at 12 hourly intervals till they attained adulthood.

Whenever, the eggs hatched, the larvae were removed and kept on a separate excised leaf on Petridish and all those were maintained individually till attaining adulthood. All the Petridishes were kept in BOD incubator where desired temperature i.e., 30°C was maintained. During the life study period the drying or decaying excised leaves were replaced with fresh ones and the mites were transferred carefully on the fresh excised leaf.

For studying sex ratio, some females were released on excised leaves kept on wet cotton swabs in petridishes and were allowed to lay eggs. After lying of sufficient eggs, all the females were removed on the following day and the total number of eggs obtained was counted. The eggs hatched into larvae and those gradually developed into adults passing through different stages. Thereafter, among the total adults obtained, the total number of females and males were counted and ratio of males and females were computed on the basis of total number of eggs with which the experiment was started.

During experimentation when mortality was noticed in any of the Petridishes, data from the said dish recorded earlier was discarded and was not considered for completion of the duration of different stages.

The duration of different stages like incubation, larval, protonymphal, deutonymphal, adult, egg to adult, preoviposition, oviposition, postoviposition, fecundity and longevity were recorded. The data so collected were subjected to statistical analysis.

## RESULTS AND DISCUSSION

**Mating** : The adults of both male and female became sexually mature immediately after emergence. Males emerged earlier than females. It was found that more than one male tried to impregnate a single female but once the female allowed the male to impregnate her, she did not allow others in doing so even at later stage.

**Incubation** : The eggs were round, about 50 microns in diameter and laid in groups of (5–8 eggs/day) on the under surface of the leaf.

The mean incubation period was  $3.33 \pm 0.23$  days having minimum of 3 days and maximum of 4 days. The percentage of hatching was  $76.65 \pm 0.41$ . The incubation period as reported by other workers were 4.20 days in *Tetranychus ludeni* feeding on okra (Puttaswamy and ChannaBasavanna, 1981), and  $4.60 \pm 0.89$  days in *Tetranychus ludeni* at 33°C (Singh *et al.*, 1989).

**Larva Stage** : The larva was light reddish in colour having three pairs of legs and move very slowly. The mean larval period was  $3.25 \pm 0.22$  days with the minimum of 3 days and maximum

of 4 days. The earlier workers like Mallik and ChannaBasavanna (1981) reported the period as 32.5 hours in case of *Tetranychus ludeni*, 1.0–2.5 days in *T. neocaledonicus* (Manjunath & Puttaswamy, 1989).

**Protonymph Stage** : This stage can be easily distinguished for the larval stage because of having 4 pairs of legs and the body colour was also deeper than the previous stage. It was more active than larval stage. The mean protonymphal period was  $3.80 \pm 0.17$  days having minimum of 3 days and maximum of 4 days. The earlier workers like Mallik and ChannaBasavanna (1983) in case of *Tetranychus ludeni* reported this period as 34.5 hours while Puttaswamy and ChannaBasavanna (1982) in case of *Tetranychus ludeni* reported this period as 2.27 days, feeding on okra leaves and 2.22 days in case of *T. neocaledonicus*. The female protonymph before moulting to the next stage passed through a short quiescent stage while male protonymphs directly moulted into adults.

**Deutonymph Stage** : Deutonymphs are larger in size, reddish orange in colour and were more active than the previous stage. The duration of this stage was  $3.60 \pm 0.15$  days, Mallik & ChannaBasabanna (1983) reported this period around 2 days in case of *Tetranychus ludeni* and Manjunath and Puttaswami (1989) reported this period as  $1.83 \pm 0.19$  days in case of *Tetranychus neocaledonicus*.

**Egg to Adult Period** : The mean egg to adult period was  $13.50 \pm 0.15$  days with the minimum of 6.00 days and maximum of 7.00 days. The percentage of mortality was found to be 16.66. This duration appeared to be on the much higher side as compared to 222 hours in *Tetranychus ludeni* (Mallik and ChannaBasavanna, 1983),  $10.16 \pm 0.74$  days at 29°C in case of *Tetranychus ludeni* (Singh *et al.*, 1989).

**Pre-oviposition Period** : The mean pre-oviposition period was  $2.50 \pm 0.15$  days. The observations as reported by other workers were 0.98 days in *Tetranychus ludeni* feeding on brinjal leaves (Puttaswamy and ChannaBasavanna, 1981) and  $1.83 \pm 0.19$  days in case of *Tetranychus neocaledonicus* (Mallik & ChannaBasavanna, 1983).

**Oviposition Period** : The mean oviposition period was  $4.70 \pm 0.14$  days. The observations reported by other workers were 10.85 days in *Tetranychus ludeni* feeding on brinjal leaves (Puttaswamy and ChannaBasavanna, 1981). Manjunath and Puttaswamy (1989) reported this period  $13.27 \pm 3.2$  days in case of *Tetranychus neocaledonicus*.

**Postoviposition Period** : The mean postoviposition period in the present study was  $6.20 \pm 0.23$  days. The observations reported by other workers were 2.30 days in *Tetranychus ludeni* feeding on brinjal leaves (Puttaswamy and ChannaBasavanna, 1981),  $1.88 \pm 0.47$  days in case of *Tetranychus neocaledonicus* (Manjunath and Puttaswamy 1989).

**Adult Longevity :** The average adult longevity in female was found to be  $13.20 \pm 0.23$  days with the minimum of 12 days and maximum of 14 days. The earlier workers like Puttaswamy and ChannaBasavanna (1982) in case of *Tetranychus ludeni* reported this period as  $27.98 \pm 4.50$  days. Singh *et al.*, (1989) in case of *Tetranychus ludeni* reported this period to be 5.60 to 5.40 days. Manjunath & Puttaswamy (1989), in case of *Tetranychus neocaledonicus* reported this period to be  $22.80 \pm 0.47$  days. Therefore the present observation was less in conformity with the other observations.

**Fecundity :** The average fecundity was  $39.80 \pm 0.85$  eggs. The earlier workers like Puttaswamy and ChannaBasavanna (1982) reported the fecundity as 149.40 eggs in case of *Tetranychus ludeni*, Manjunath & Puttaswamy (1989), on *Tetranychus neocaledonicus* reported this period to be  $75.83 \pm 22.40$  eggs. Therefore the fecundity in the present observation was much less than the earlier observations.

**Sex Ratio :** The Male : Female sex ratio was found to be 1 : 1.65. So, the sex ratio appeared to be slightly female biased.

Life cycle of *Tetranychus neocaledonicus* Andre on *Rhizophora mucronata* Under Laboratory condition at control temperature ( $30^{\circ}\text{C} \pm 1^{\circ}\text{C}$ ) :

Stage	Range	Average (n = 10)	Duration
Egg	3–4 days	3.33 days	$3.33 \pm 0.23$ days
Larva	3–4 days	3.25 days	$3.25 \pm 0.22$ days
Protonymph	3–4 days	3.8 days	$3.8 \pm 0.17$ days
Deutonymph	3–4 days	3.6 days	$3.6 \pm 0.15$ days
Egg to Adult	13–14 days	13.5 days	$13.5 \pm 0.15$ days
Pre-oviposition	2–3 days	2.5 days	$2.5 \pm 0.15$ days
Oviposition	4–5 days	4.7 days	$4.7 \pm 0.14$ days
Post-Oviposition	5–7 days	6.2 days	$6.2 \pm 0.23$ days
Fecundity	37–43 eggs	39.8 eggs	$39.8 \pm 0.85$ eggs
Adult Longevity	12–14 days	13.2 days	$13.2 \pm 0.23$ days
% of Hatching :	75–80%	76.65%	$76.65 \pm 0.41\%$
% of Mortality :	16.66%		
Sex Ratio (M : F)	1 : 1.65		
n = Number of observations			

## SUMMARY

The present paper reports the duration of different developmental stages of *Tetranychus neocaledonicus* Andre along with fecundity, longevity and sex ratio. The life cycle (egg to adult) took  $13.5 \pm 0.15$  days. The fecundity, longevity and Male : Female sex ratio were  $39.8 \pm 0.85$  eggs,  $13.2 \pm 0.23$  days and 1 : 1.65, respectively.

## ACKNOWLEDGEMENTS

The authors are thankful to Ministry of Environment and Forests, Govt. of India for financing this project, without which this work would not have been possible.

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