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OBSERVATIONS ON SPIDERS (ORDER : ARANEAE) PREDACIOUS ON THE COCONUT LEAF EATING CATERPILLAR *OPISINA ARENOSELLA* WLK. (= *NEPHANTIS SERINOPA* MEYRICK) IN KERALA : BIOLOGY OF *RHENE INDICUS* TIKADER (SALTICIDAE) AND *CHEIRACANTHIUM* SP. (CLUBIONIDAE)*

B. SATHIAMMA, S. P. JAYAPAL & G. B. PILLAI

Biological Control Laboratory, Central Plantation Crops Research Institute, Regional Station, Kayangulam, Krishnapuram, Kerala, India 690 533

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Biology of *Rhene indicus* and *Cheiracanthium* sp. was studied under laboratory conditions. The different life stages were reared using caterpillars of *Opisina arenosella* as prey. *R. indicus* males required a mean of 83 (range 67—104) days after hatching to maturity, reached adulthood after six moults and lived for an average of 51.25 (range 25—77) days. Females required a mean of 79.5 (range 59—105) days after hatching to maturity, reached adulthood after six moults and lived for an average of 139.83 (range 71—296) days. Females were found to oviposit 6—31 days after mating, produced 7—10 broods and the number of spiderlings emerged from single egg mass varied from 9—37. The spider started feeding on early instar caterpillars of *Opisina* from the second instar onwards and the prey consumption ranged from 2—207 caterpillars.

Males of *Cheiracanthium* sp. required a mean of 214.6 (range 162—261) days after hatching to maturity, reached adulthood after 12 moults, and lived for an average of 74.5 (range 35—122) days as adult. Females required a mean of 207 (range 169—248) days after hatching to maturity, reached adulthood after 12 moults and lived for an average of 85.7 (range 51—127) days as adult. Females oviposited in 8—30 days after mating, produced one to four broods and the number of spiderlings emerged from single egg mass varied from 9—86 with an average of 49.1. Except the first instar all the eleven instar spiderlings consumed *Opisina* caterpillars and the rate of feeding was observed to vary from 2—151.

(Key words: predacious spiders, *Opisina arenosella)*

Rhene indicus Tikader and *Cheiracanthium* sp. are two of the most widely distributed spiders predacious on *Opisina arenosella* in Quilon and Alleppey districts of Kerala, where this pest is a serious problem (SATHIAMMA *et. al.* unpublished). The predacious habits of the spiders were studied by the authors in detail (SATHIAMMA *et. al.* unpublished). The increasing interest on the high feeding potential of the spiders and the significant role they play in the natural suppression of this key pest of the coconut palm, have necessitated detailed studies on their biology.

Information available on the biology of the spiders is relatively limited. The

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developmental history of *Latrodectus mactans* (Fabr.) at different rates of feeding was studied by DEEVEY (1949). MANSOUR *et al.* (1980) studied the biology of *Cheiracanthium mildei* and PECK & WHITCOMB (1970) the biology of *C. inclusum*. The present paper embodies the results of the study on the biology of *Rhene indicus* and *Cheiracanthium* sp. under laboratory conditions.

MATERIALS AND METHODS

Spiders were reared individually in glass containers (size 17×6.5 cm) in the laboratory under a temperature range of 22—34°C and relative humidity range of 32—96%. They were fed with the early instar caterpillars of *O. arenosella*. Observations on the duration of different life stages, moulting, longevity and feeding potential were recorded daily.

RESULTS AND DISCUSSION

1. *Rhene indicus* Tikader

The female spins a resting cell and hides herself in this cell for egg laying. The eggs are covered by a strong egg sac. They are semitransluscent, yellowish-white and spherical. Egg period is completed in 12 days. The newly emerged spiderlings are whitish yellow. The first moult takes place at about the seventh day after emergence from the egg sac. The body of the spiderling is covered with hairs and spines and these become dark before 24th hr of the first moulting *R. indicus* completed its life cycle after the sixth moult (Fig. 1). The female spider completed development in 79.5 (range 59—105) days and male 83 (range 67—104) days (Table 1). The duration of the egg and first instar spiderling were uniform for both male and female spiders. All the subsequent instars recorded widely varying durations. Adult females lived, on an average, for 139.83 days and males 51.25 days. The males

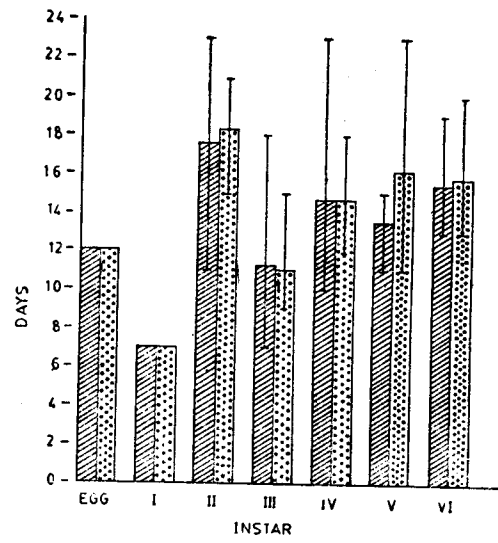

Fig. 1. Duration of immature stages of *Rhene indicus*

were short-lived. The females attained adult phase earlier and lived for longer periods than the males.

The female spider constructed a thin horizontal webbing inside the glass jar and conceals inside the webbing, which forms the egg sac. The eggs are laid in this sac. The egg sac is made more tightly webbed and kept completely sealed off from outside. The female remains in close contact with the egg sac for the entire period, periodically moves around it and palpates it. The first instar spiderlings, which remain inside the resting cell, were also taken care of by the mother spider till they undergo the first moult. During this period the mother consumes only very little food.

Mature fertilised females laid 7—10 egg masses in captivity. The female oviposited from 6 to 37 days after mating. The number of egg massess which a female produced was directly proportional to the life span of the female. The virgin female

TABLE 1. Days to maturity, number of immature stadia and adult life span of *Rhene indicus*.

Duration	female			male		
	days to maturity	No. of immature stadia	adult life span (days)	days to maturity	no. of immature stadia	adult life span (days)
Mean	79.5	6	139.83	83	6	51.25
Maximum	105.0	6	296.00	104	6	77.00
Minimum	59.0	6	71.00	67	6	25.00
No. of replications	10	10	6	6	6	4

TABLE 2. Consumption of caterpillars of *O. arenosella* by the immature adult stages of *Rhene indicus*.

Stage	prey consumption per stage				prey consumption per day			
	female		male		female		male	
	mean	range	mean	range	mean	range	mean	range
I	0	0	0	0	0	0	0	0
II	7.63	6—12	6.00	4—8	0.43	0.31—0.57	0.32	0.26—0.41
III	5.00	3—8	5.67	4—9	0.44	0.27—0.77	0.51	0.33—0.66
IV	6.27	3—13	5.83	4—9	0.40	0.16—0.86	0.38	0.27—0.52
V	5.00	2—9	6.83	4—12	0.35	0.15—0.54	0.40	0.30—0.52
IV	7.18	4—10	8.00	5—15	0.46	0.25—0.62	0.51	0.25—1.00
Adults	97.88	49—207	15.30	12—31	0.70	0.38—1.14	0.30	0.21—0.52

produced infertile egg massess. A single egg mass gave emergence to 9—31 spiderlings in laboratory cages.

R. indicus, at all stages of its growth, consumed *Opisina* caterpillars and the rate of feeding varied from 2 to 207 caterpillars (Table 2). Adult spiders fed more than the immature stages and the females showed high feeding potential than the males. The prey consumption per stage varied from 49 to 207 in the case of the female and 12 to 31 in the male. The rate of prey consumption per predator was observed to be 0.38 to 1.14 in the female and 0.21 to 0.52 in the male. The first instar spiderlings depended on the egg yolk for their food and were never observed to feed on the prey caterpillars. However, from the second instar to the sixth and the adult spiders consumed early instar *Opisina* caterpillars.

2. *Cheiracanthium* sp.

The female spider conceals herself in a brood cell constructed prior to the

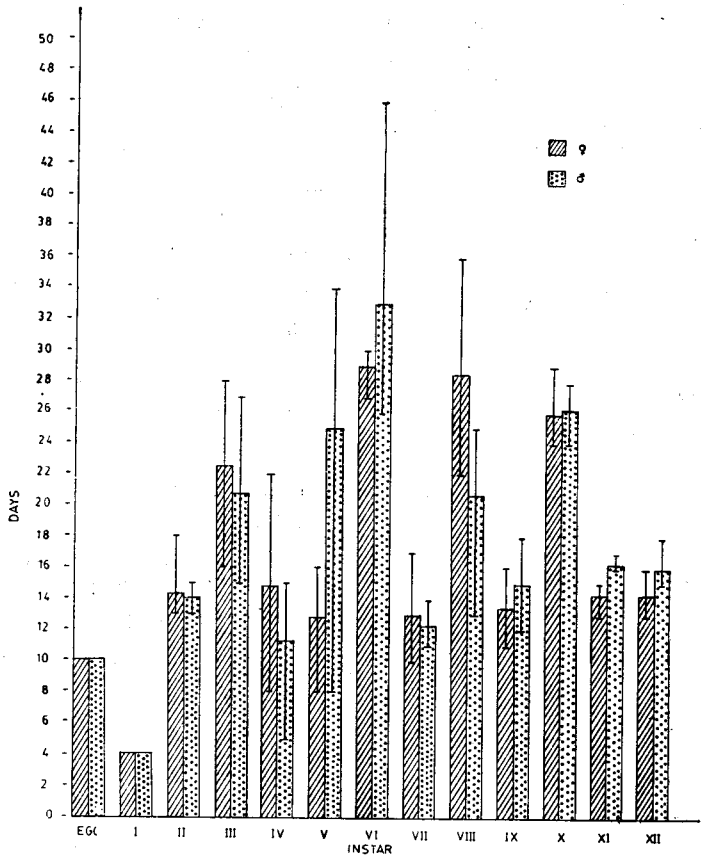

Fig. 2. Duration of immature stages of *Cheiracanthium* sp.

oviposition and lays the eggs. The eggs are semitranslucent, yellowish white, spherical and measure about 2 mm in diameter. About the sixth day after oviposition, the mother spider gradually loosens the egg sac. First instar spiderlings emerge from the eggs after the tenth day of oviposition. The newly emerged spiderlings are whitish yellow. By about the third day of emergence, hairs and spines appear on their appendages.

Under labotatory conditions *Cheiracanthium* sp. matures after the twelfth moult (Fig. 2). The female spider requires a mean of 207 days (range 189—248) and male 214.6 (range 162—261) for its development.

The first two stadia are more or less uniform in duration with an egg period of 10 days and first instar of 4 days. All the subsequent instars took widely varying durations. Females developed rather earlier than the males. Adult females on an average lived for 85.7 days (range 51—127) and the males 74.5 days (range 35—122).

TABLE 3. Consumption of caterpillars of *O. arenosella* by the immature and adult stages of *cheiracanchium* sp.

Stage	consumption per stage				consumption per day			
	female		male		female		male	
	mean	range	mean	range	mean	range	mean	range.
I	0	0	0	0	0	0	0	0
II	3.00	3—3	4.33	3—7	0.21	0.16—0.23	0.30	0.21—0.46
III	7.00	5—7	6.33	5—8	0.31	0.30—0.32	0.32	0.22—0.40
IV	4.50	3—6	4.00	2—7	0.32	0.22—0.37	0.41	0.33—0.50
V	4.75	3—8	14.00	4—22	0.38	0.21—0.61	0.54	0.47—0.66
VI	12.75	10—15	14.66	5—21	0.44	0.40—0.53	0.43	0.18—0.68
VII	5.50	3—8	9.33	5—14	0.41	0.30—0.50	0.77	0.41—1.27
VIII	13.50	7—26	15.00	14—17	0.47	0.31—0.72	0.78	0.54—1.07
IX	10.75	8—14	10.67	9—13	0.81	0.61—1.24	0.71	0.66—0.72
X	25.25	20—39	25.00	21—31	0.97	0.72—1.50	0.94	0.82—1.14
XI	27.50	19—35	26.00	22—28	1.93	1.26—2.33	1.60	1.29—1.75
XII	22.36	27—32	36.33	28—43	2.07	1.87—2.28	2.28	1.86—2.86
Adult	101.98	60—151	52.15	24—86	1.19	0.84 -3.00	0.70	0.31—0.73

One day prior to oviposition the female spider constructs a resting cell, one side of which is kept open. During oviposition an egg sac is constructed inside the resting cell. The egg sac is spherical and it is woven more titghtly and densely covered than the resting cell and is always sealed off completely from the external environment.

After egg laying the mother spider remains in close contact with the egg mass for the entire period, moving around it periodically and touching it with her palpi. The first instar spiderlings are also taken care of by the mother till the first moult. She takes only very little food during this period. When the spiderlings are ready for an independant life the mother tears of the fabric of the brood cell and this enables the spiderlings to come out.

In glass cages the fertilised females produced one to four egg masses. The number of egg massess produced was directly proportional to the life span of the female. The virgin females produced infertile egg masses, which in all cases degenerated in a few days. On an average 49.1 (range 9—86) spiderlings emerged from single egg mass, and this number varied from spider to spider and brood to brood of the same spider. The female oviposited 8—30 days after mating and spent about 14 days with the eggs and spiderlings. The females took, on an average, 23.85 days (range 17—31) between successive ovipositions.

The females lived for longer periods than the male, but duration of development varied from progeny to progeny.

Cheiracanthium sp. feeds on all stages of *O. arenosella*. Second and third instar spiderlings preferred the early instar caterpillars of *Opisina*. Maximum consumption was noted in the tenth, eleventh and twelfth instars and adult spiders (Table 3). Considering the per day consumption the feeding rate increased progressively from the second instar to the final instar. As compared to the immature stages, the rate of consumption was quite high in the adult spiders, the females consumed, on an average, 101.98 (range 60—151) and males consumed 52.15 (range 24—86) *Opisina* caterpilllars as compared to the maximum feeding of 22.36 and 36.33 caterpillars in the twelfth instar female and male, respectively.

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