LIFE TABLE STUDIES OF SOME SPIDERS FROM WESTERN GHATS

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The rich species diversity in Western Ghats offers several benefits to mankind in terms of medicinal value and gene pools. There are more than 30,000 species of spiders under 3000 genera and 105 families have been recognized all over the world. They are important predatory organisms in all ecosystems they inhabit, with a high prey finding ability and capacity to consume greater number of prey than any other predator. They are the only class of arthropods that are entirely predaceous (Kamal *et al*., 1990). They feed on a variety of organisms such as insects, small mice, bats, fish, crabs, frogs, lizards, snakes and scorpions. Thus, spiders help maintain the biotic balance of nature. Despite this importance, the role of spiders in the management of pest populations has only been lately recognised and scant attention is given to them as pest control agents in India. Though, several studies have been made on spiders, most of them were limited to the investigation of the species composition and their seasonal occurrence in the field.

The study was carried out at the Biodiversity Laboratory, Department of Environmental Sciences, Tamil Nadu Agricultural University, Coimbatore. The Survey for collection of spiders was carried out in different forest ecosystems associated with the Western Ghats of Tamil Nadu.

Life table studies: Egg sacs were collected from different forest ecosystems and the spiderlings hatched from the egg sacs were individually reared in containers. The spiderlings were maintained separately to study the developmental period, survival and adult longevity. Individual spiderlings were kept in containers of size 7cm x 11.5cm. The top of the container was provided with holes for aeration and water was provided to the spiders through a ball of water-soaked cotton. Adult *Drosophila melonogaster* was provided as food during the first four instars of spiderlings and for the later instars, larvae of *Corcyra cephalonica*, crickets, moths, and grasshoppers were provided. The feed was given every alternate day after anaesthetizing the prey with carbon-di-oxide. The life table was constructed as per the method of Carey (1993).

***Peucetia viridana* (Stoliczka, 1869)**

Life table studies revealed that the first 11 instars lasted for a total of 353 days. The adult longevity was 42 days. Mortality was highest during the eigth instar (18.00%). It was observed that 30% of the spiderlings reached adult-hood successfully. The entropy value for *P. viridana* reflected that 4.09 days would be gained by the average individual if every first death was averted. The growth index was 2.53 (Table 1)

***Oxyopes javanus* Thorell, 1887**

For *O. javanus*, the first 11 instars lasted for 235 days, and the adult longevity was 31 days. The mortality of the individuals was 13% during second, sixth and tenth instars and only 7% of the individuals reached adulthood. The entropy value was 5.17, which indicated that 5.17 days would be gained by the average individual, if every first death was averted. The growth index was 3.60 (Table 2).

***Heteropoda venatoria* (Linnaeus, 1767)**

Heteropoda venatoria also passed through 11 instars which lasted for 282 days, and the adult longevity was 45 days. Maximum mortality occurred during the tenth instar (15.00%). It was observed that 22% of the spiderlings reached adulthood successfully. The entropy value for this spider reflected that 4.09 days would be gained by the average individual if every first death was averted. The growth index for *H. venatoria* was 2.54 (Table 3).

Tikader (1987) reported that in general, the number of eggs in a sac varied from 1 to 2000, but 100 to 300 is normal. Comparision of the fecundity of different species of spiders showed that *Argiope aemula* produced the maximum number of eggs with higher percentage of fertile eggs. Life cycle of *Peucetia viridana* ranged from 266 to 353 days. All these were found to pass through 10 to 11 instars to reach adulthood. Thang *et al.* (1988) reported that the wolf spider *Pardosa pseudoannulata* passed through 10 instars to reach adulthood, whereas Nirmala (1990) reported the presence of only eight instars. Berland (1932) reported that the orthognate purse-web spider *Atypus* was reported to survive for seven years, while large tarantulas lived over 20 years. Eckert (1967) reported that small spiders needed only a few moults (about five) whereas large spiders pass through about 10 moults to reach the adult stage. It was reported that early nymphal stages may moult every few days, but later instars needed several weeks to prepare for the next moult. The number of moults could also be influenced by the availability or non-availability of food.

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***Table 1. Life table of* Peucetia viridana**

Stage (n = duration in days)	Age interval	Fraction n living at Age x lx	Fraction surviving from x to x+1 Npx	Fraction dying from x to x+1 Nqx	Fraction dying in interval x to x+1 Ndx	Days lived in interval Lx NLx	Number of days lived beyond age X Tx	Expectation of life ex
I instar(n=33)	0-33	1.00	0.94	0.066	0.07	32.01	226.71	226.71
II instar(n=27)	33-60	0.94	0.96	0.04	0.04	24.84	421.41	448.31
III instar(n=28)	60-88	0.90	0.98	0.02	0.02	24.92	396.57	440.63
IV instar(n=31)	88-119	0.88	0.93	0.06	0.06	26.35	371.65	422.33
V instar(n=35)	119-154	0.82	0.95	0.05	0.04	28.00	345.30	421.10
VI instar(n=29)	154-183	0.78	0.92	0.08	0.06	21.75	332.97	426.88
VII instar(n=31)	183-214	0.72	0.86	0.14	0.10	20.77	324.16	450.22
VIII instar(n=32)	214-244	0.62	0.71	0.29	0.18	16.96	318.29	513.37
IX instar(n=29)	244-273	0.44	0.86	0.14	0.06	11.89	312.99	711.35
X instar(n=38)	273-311	0.38	0.79	0.21	0.08	12.92	312.66	822.80
XI instar(adult)(n=42)	311-353	0.30	0.00	1.00	0.30	6.30	317.83	1059.44
					1.00	226.71		

Entropy Value - 4.089; Growth index - 2.53

***Table 2. Life table of* Oxyopes javanus**

Stage (n = duration in days)	Age interval	Fraction n living at Age x lx	Fraction surviving from x to x+1 Npx	Fraction dying from x to x+1 Nqx	Fraction dying in interval x to x+1 Ndx	Days lived in interval Lx NLx	Number of days lived beyond age X Tx	Expectation of life ex
I instar(n=25)	0-25	1.00	0.93	0.07	0.07	24.17	99.73	4.13
II instar(n=10)	25-35	0.93	0.86	0.14	0.13	8.67	175.29	20.22
III instar(n=11)	35-46	0.80	0.88	0.12	0.09	8.29	166.62	20.11
IV instar(n=14)	46-60	0.71	0.90	0.09	0.07	9.43	158.33	16.80
V instar(n=16)	60-76	0.64	0.73	0.27	0.17	8.85	148.91	16.82
VI instar(n=18)	76-94	0.47	0.71	0.28	0.13	7.20	140.05	19.45
VII instar(n=22)	94-116	0.33	1.00	0.00	0.00	7.33	145.29	19.81
VIII instar(n=23)	116-139	0.33	1.00	0.00	0.00	7.67	147.64	19.26
IX instar(n=30)	139-169	0.33	0.72	0.28	0.09	8.60	152.67	17.75
X instar(n=32)	169-201	0.24	0.44	0.55	0.13	5.55	159.38	28.73
XI instar(n=34)	201-235	0.11	0.63	0.37	0.04	2.95	168.08	57.04
XII instar(adult)(n=31)	235-266	0.07	0.00	1.00	0.07	1.03	174.91	169.27
					1.00	99.73		

Entropy Value - 5.17; Growth index - 3.60

***Table 3. Life table of* Heteropoda venatoria**

Stage (n = duration in days)	Age interval	Fraction n living at Age x lx	Fraction surviving from x to x+1 Npx	Fraction dying from x to x+1 Nqx	Fraction dying in interval x to x+1 Ndx	Days lived in interval Lx NLx	Number of days lived beyond age X Tx	Expectation of life ex
I instar(n=13)	0-13	1.00	0.91	0.09	0.09	12.43	131.14	131.14
II instar(n=11)	13-24	0.91	0.93	0.07	0.06	9.68	249.85	273.64
III instar(n=16)	24-40	0.85	0.87	0.13	0.11	12.70	240.16	283.27
IV instar(n=22)	40-62	0.74	0.88	0.12	0.09	15.30	227.47	307.75
V instar(n=23)	62-85	0.65	0.90	0.10	0.06	14.25	212.06	325.32
VI instar(n=18)	85-103	0.59	0.85	0.15	0.09	9.78	197.91	337.18
VII instar(n=24)	103-127	0.50	0.96	0.04	0.02	11.74	188.13	376.26
VIII instar(n=28)	127-155	0.48	0.86	0.14	0.06	12.48	208.40	435.75
IX instar(n=39)	155-194	0.41	0.89	0.10	0.04	15.26	220.76	534.48
X instar(n=43)	194-237	0.37	0.59	0.41	0.15	12.62	230.42	623.49
XI instar(adult)(n=45)	237-282	0.22	0.00	1.00	0.22	4.90	244.15	1123.10
					1.00	131.14		

Entropy Value - 4.089G; Growth index - 2.54