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BIONOMICS OF SORGHUM EARHEAD BUG, CALOCORIS ANGUSTATUS LETHIERRY **

N. NATARAJAN [1] AND P. C. SUNDARABABU [2]

ABSTRACT

Biology of earhead bug *Calocoris angustatus* Lethierry was studied during July to August 1984 and April to May 1985. The preoviposition period, oviposition period, day of highest egg laying, total number of eggs laid, egg period, Total life Period and sex ratio during the first and second seasons being 2.70, 11.7th day, 129.10, 6.63, 33.06, 1.275 and 3.17, 6, 5th day 99.09 5.57, 24.37, 1: 1.50 respectively. The females lived longer than males irrespective of the rearing seasons.

Sorghum earhead bug, *Calocoris angustatus* Litherry (Miridae: Hemiptera) is one of the key pests of sorghum attacking the panicle from the time of initiation to maturity resulting in chaffy earhead with a few shrivelled grains. Biology of this pest was studied at Coimbatore by Ballard (1916), cherian *et at*. (1941 and after lapse of long gap by ICRISAT(1981) and Teetes *et at*.[1983] at Hyderabad, In the present study, ovipositional behaviour, biology and, biometrics of the insect studied in two different seasons were compared.

MATERIALS AND METHODS

Biology of earhead bug was studied in the laboratory in two periods viz, July to August, 1984 (rainy season) and April to May, 1985 (summer season) using sorghum hybrid CSH 5, under the prevailing temperature of 28+5° C and 32+5°C during the rainy and summer season respectively.

For studying the ovipositional behaviour of eathead bugs, single pair of freshly emerged male and female was confined in a cylindrical mylar cage containing one day-old unopened flower rachis as ovipositional substrate and 15-day old milky stage rachis kept in a vial with water as food source. Fresh ovipositional substrate and food source were provided daily till the death of female insect. The rachi that were removed were dated, kept in a mylar cage individually and observed for emergence of nymphs. The nymphal emergence from a

** Part of Ph. D. thesis submitted to the Department of Agriculture Entomology, Tamil Nadu Agricultural University Coimbatore.

1. Assistant Professor (Entomology), National Pulses Research Centre Vamban, Tamil Nadu.
2. Professor andH ead (Entomology), Agricultural College Research and Instituted Madurai 625 104

particular dated rachis indicated the start of oviposition period and the previous period from which no nymphal emergence was observed was considered as pre-oviposition period. The flowers of ovipositional sbstrate were dissected on the eighth day of exposure to female to observe the unhatched eggs if any. The fecundity, fertility and sterility rate of eggs were recorded.

The biometrics of different stages of earhed bug was studied in another sef of experiment by allowing a pair ot male and female in a mylar cage and providing with one day-old unopened flower rachis for oviposition and 15 day-old-milky stage rachis as food mateial. After the pre ovipositeon period of three days i. e., on fourth day the flower rachis was dissected and 50 eggs were collected. The eggs were ransferred individually to small glass tube (6x0. 5 cm), closed with cotton wool plug and kept over moist and to study the development and morphological changes. Biometrics of egg was recorded using ocular stage micrometer with 30 eggs.

As the egg turned reddish orange, it was transferred to early milky stage rachis kept in a vial using camel hair brush (No. 1) and covered with mylar cage. The rachis served as food material for the nymphs immediately after hatching. The nymphal development and morphologicel changes were observed. Frash food material was provided as and when needed. The width of head, length and width of body of live insect were measured. Moulted skins of each instar were collected and head widht was measured. Nymphs attaining adult stage were recorded. The number of male and female produced were recorded. Their longevity, sex ratio and biometric observations were gathered. The total life period per individual was obtained by adding egg, nymphal and adult periods together.

RESULTS AND DISCUSSION

Biology of the insect studied in two periods coinciding with insect activity viz., in rainy season (July to August, 1984) having higher humidi ty and lower temperature and summer season (April to May, 1985) with higher temperature and lowe humidity revealed that the first season was favourable for the insect development as indicated by higher fecundity, fertility and female proportion than in the second season. Data on egg laying pattern by the female earhead bug during the two seasons are presented in Table 1. The total number of eggs laid was 129.10 with a fertility rate of 94.85 per cent during the rainy season whereas it was only 99.09 eggs having fertility of 94.85 per cent during summer season. In rainy season, three day old adults started laying eggs and continued for 11 days registering 11.74 egg per day, whereas in the summer season, eggs laying was from fourth day onwards restricting to six days resulting in higher perday

Table 1 Ovipositional behaviour of earhead bug

Age of insect (days)	First season July to Angust, 1984 (Mean of 20 obserevation Eggs/female (Nos)			Second season March to April, 1985 (Mean of 12 observations) Eggs/female (Nos)		
	Fecundity	Fertile	Sterile	Fecundity	Fertile	Sterile
3	2,5	2.00	0.05	—	—	—
4	8.80	8.80	0.00	18.42	18.25	0.17
5	21.30	20.85	0.45	25.75	25.42	0.33
6	23.90	23.50	0.40	24.83	22.83	2.00
7	24.20	23.55	0.65	14.67	12.00	2.67
8	17.75	17.25	0.50	9.75	7.92	1.83
9	11.15	10.60	0.55	5.67	5.08	0.58
10	8.25	7.55	0.70	—	—	—
11	6.40	5.10	1.30	—	—	—
12	3.80	2.90	0.90	D	D	D
13	1.50	0.35	1.15	D	D	D
Total	129.10	122.45	6.65	99.09	91.50	7.58
Mean	11.74	11.13	0.60	16.52	15.25	1.26
Percent		94.85	5.15		92.34	7.66
SD	8.61	8.73	0.40	8.06	8.21	1.04

— = NO oviposition D = Insect dead

Table 2 Seasonal biology of earhead bug

Particulars	First seasen July to August, 1984			Second season April to May, 1985		
	Range	Mean	SD	Range	Mean	SD
Preovipositlon period*(Days)	2–4	2.70	0.66	3–4	3.17	0.39
Oviposition period*(Days)	8–11	9.15	0.88	3–6	5.23	0.09
Febundity/ female(No.)	120–160	129.10	12.29	76–121	99.08	13.01
Fertile eggs/ female[No.]	102–150	122.45	11.47	76–113	91.50	11.61
Sterile eggs/ female[No.]	0–16	8.05	5.02	0–15	7.58	4.34
Egg period** [Days]	6–7	6.63	0,49	5–7	5.97	0.49
Nymphal period** [Days]	10–11	10.63	0.49	10–11	10.63	0.49
I Instar**	2–3	2.63	0.49	2–3	2.63	0.49
Each II, III, IV & V instars **	–	2	–	–	2	–
Agult Longevity** [Days] [irrespective of sex]	14–18	15.80	1.10	6–10	7.93	1.08
Male longavity** [Days]	14–16	15.38	0,92	6–9	7.08	0.79
Female longevity **[Days]	14–18	15.95	1.13	7–10	8.50	0.86
Total life Period**[Days] [Irrespective of sex]	31–35	33.06	1.20	22 26	24.57	1.22
Male total life period**[Days]	31–34	32.38	1.19	22–25	23.58	1.10
Female total life period** [Days]	31–35	33.50	8.65	24–26	25.17	0.92
Sex ratio Male: Eemale]	1:2.75			1:1.50		

* Mean of 20 observations in first seasen and 12 observatious in second season

** Mean of 30 observations for both the seasons.

Table3 Biometrics of different steges of earhead bug (*µm*))Means of 25 observations)

Particulars	Head with			Bady Width			Bady Length		
	Range	Mean	SD ±	Range	Mean	SD ±	Range	Mean	SD ±
Egg	250-400	375		225-300	259	24.87	975-1075	1016	33.76
I Instar nymph	250-400	315	45.07	450-625	551	63.93	1375-1775	1636	118.60
II Instar	475-525	497	18.14	725-925	815	55.90	1825-2325	2099	121.51
III instar	625-650	640	12.50	925-1200	1055	70 71	2875-3375	2996	585.00
IV instar	750-775	757	11.46	1250-1600	1400	93.26	3625-4850	4352	289.30
V instar nymph	800-850	825	12.50	1425-1900	1805	115.24	5450-5750	5582	87.65
Adult male	825-875	850	17.68	1325-1550	1459	57.23	5075-5250	5154	50.87
Adult female	825-900	867	23.63	1625-1825	1745	51.17	5350-5750	5582	87.65

fecundity of 16.52 eggs. The difference in the oviposition behaviour in these two seasons might be due to influence of weather fectors as suggested by Cherien *et al.* (1941) that the prevailing weather conditions during the rearing period influenced the egg laying by either inhibiting or accelerating the tendency. Strong and Sheldehl (1970) found the mirid bug, *Lygus hesperus* Knight to produce more population at 26 to 32°C than at higher temperature. Khattat and Stewart(1977) observed that the development of *L. lineolaris* (P de B.) on shoots of potato was faster at higher temperature with reduction in egg viability and nymphal survival. In the present study also, reduced fecundity, fertility and shorter life period was noticed in summer which had higher temperature and lower humidity.

Information on the life of the insect starting from egg till its death is presented in Table 2. Pre-oviposition peroid was 2.70 days in the rainy season while it was 3.17days in the summer season. Ballard (1910) noticed the beginning of oviposition after two to three days of pairing in *C. angustatus*. The reports of ICRISAT (1981) revealed that the pre-ovipositton period was two to four days for *C. angustatus*. Egg period was 6.63 and 5.97 days for rainy and summer seasons respectively. First instar nymphal period was wo to three days whereas the rest of the instars moulted once in wo days.

Butler (1970) reported that as the rearing temperature increased the egg period decreased in the case of *L. desertus* Knight on beans. In both the seosons, nymphal period was similar in the earhead bug. Male and female survived for 15.38 and 15.95 days in the rainy season, whereas it was 7.08 and 8.50 days in the summer season respectively. Males lived shorter than females irrespective of the rearing season, This is in confirmity with the reports of ICRISAT (1981) on *C. angustatus* with 10.5 and 12.6 days for males and females respectively. Such a shorter longevity for males was reported earlrer in the mirid *L. hesperus* on lucerne (Leigh,1963).

Considering total life period (irrespective of sex) it was 33.06 days during the rainy season, but in the summer it was only 24.57 days with a reduction of 8.49 days. Studies on cotton mirids showed that the development was enhanced when the temperature increased from 2 0to 35°C and beyond this the development was adversely affected (Ting, 1963). In both the seasons, females were more in number and a so lived longer than males. The sex ratio of male and female was 1:2.75 and 1: 1.50 for rainy and summer season, respectively. Preponderance of female was noticed in both the seasons, Hiramath and Thontadarya(1984) also reported higher ratio (1:1 25.) in earbead bug as observed in current investations. Among the two periods of the study, the rainy season showed higher male famele ratio than the summer season which may be attributed to the abiotic factors that prevailed during the season.

The biometrics of variuos stages and head width of nymphal instars are provided in Table 3. Eggs are Iridescent, elongate and cigar-shaped measuring 1016/um long and 259/um wide. The newly hatched first instar nymphs are reddish orange, with the body length and width of 1636 and 581/um respectively. The head width of live insect was 315/um. Second instar insects are light oange with three darker redish spots each one on third, fourth and fifth abdominal segments. The head width was 497 /um The length and width of the body were 2099 and 815/um respectively. Insects of third instar are light greenish yellow with a reddish orange spot on third abdominal segment. Length and width of the body were 2996 and 1055/um respectively. The head width was 640/um in live insects.

Fourth instar insects are light green and wing pads appear in this stage. The width of the head, body length and width were 757, 4352 and 1400/um respectively. During fifth instar, insects attain bigger size with a body length and width of 5582 and 1805/um respectively. The head width was 825/um. Wing pads are very prominent and males show darker pads while females have green colour pads. Adults ars yellowish green. The clavus of membrane regions of males are suffused with dark brown whereas females have a light brown tinge in membrane region only. In the case of males, abdomen is narrow with brown tip, while in females abdominal tip is blunt with prominant ovipositor. Females are bigger than males measuring a body length of 5582/um and head width of 867/nm and body width of 1744/um Males measured 5154,1459 and 850 um of length width of body and head width respectively. The descriptions of various stages of insect made are in agreement with Ballard (1916), but the biometric observations revealed a slight variation.

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