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Life Table of *Chrysoperla zastrowi sillemi* (Esben-Peterson) on Different Hosts

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Abstract

Studies the life table of *C. zastrowi sillemi* was carried out at constant temperature of 25 ± 1°C on Mustard aphid [*Lipaphis erysimi* (Kaltenbach)], Maize aphid [*Rhopalosiphum maidis* (Fitch)], Cotton aphid [*Aphis gossypii* (Glover)], Cabbage aphid [*Brevicoryne brassicae* (Linnaeus)], Coriander aphid [*Hyadaphis coriandri* (Das)], Cotton mealy bug [*Phenacoccus solenopsis* (Tinsley)] and eggs of rice moth [*Corcyra cephalonica* (Stainton)] during the year 2020-21. the net reproductive rate (R_0) of *C. zastrowi sillemi* on mustard aphid, maize aphid, cotton aphid, cabbage aphid, coriander aphid, cotton mealy bug and eggs of *C. cephalonica* was 66.81, 85.27, 88.06, 74.34, 68.05, 59.73 and 77.11, respectively. The mean length of generation also differed on these hosts. It was maximum on cabbage aphid (41.51 days) and minimum on eggs of *C. cephalonica* (39.18 days). The innate capacity of increase in number (r_m) was ranged from 0.0958 to 0.1028. The finite rate of increase was worked out as 1.1069, 1.1138, 1.1145, 1.1094, 1.1102, 1.1083 and 1.1173 females per female per day on mustard aphid, maize aphid, cotton aphid cabbage aphid, coriander aphid, cotton mealy bug and eggs of *C. cephalonica*, respectively.

Key words : *Chrysoperla zastrowi sillemi, life table.*

Introduction

Natural enemies play an important role in agro-ecosystems, offering a valid alternative or integration with other control methods (1, 2, 3). The predators are scattered and distributed in about 167 families belonging to 14 orders of class insecta (4, 5, 6). Lacewings or net-winged insects (Neuroptera: Chrysopidae) are soft-bodied insects, most commonly medium-size, comprising about 6,000 species in 18 families. Lacewings include mantispids (mantisflies), green lacewings, owlflies, antlions and their relatives. Order Neuroptera consist three suborders: Hemerobiiformia, Myrmeleontiformia and Nevrorthiformia. Suborder Hemerobiiformia comprises 11 families and Chrysopidae are one of them. Worldwide, it consists 1200 species (7, 8, 9). In India, 65 species of chrysopids belonging to 21 genera have been recorded from various crop ecosystems (8, 10).

Materials and Methods

For constructing the life table, the culture of *C. zastrowi sillemi* was maintained at constant temperature of 25 ± 1°C using B.O.D. incubator at AICRP on Biological control of Crop Pests, AAU, Anand during the year 2020-21. For life table of *C. zastrowi sillemi*, on seven different hosts. *viz.,* Mustard aphid [*Lipaphis erysimi* (Kaltenbach)], Maize aphid [*Rhopalosiphum maidis* (Fitch)], Cotton aphid [*Aphis gossypii* (Glover)], Cabbage aphid [*Brevicoryne brassicae* (Linnaeus)], Coriander aphid [*Hyadaphis coriandri* (Das)], Cotton mealy bug [*Phenacoccus solenopsis* (Tinsley)] and eggs of rice moth [*Corcyra cephalonica* (Stainton)]. Freshly laid 100 eggs were collected from the cage with the help of wet camel hair brush and placed in 10 Petri dishes in batches of 10 each. The eggs were put on the slides in one row to facilitate observations on hatching. Fresh food was provided daily in the morning to the newly hatched larvae. All the larva after hatching was reared individually on different hosts. Observations on hatching, total larval development, formation of pupae, emergence of adults and fecundity of females was recorded daily. Age specific mortality in different developmental stages such as eggs, larvae, pre-pupae, pupae and adults were recorded. With a view to determine the age specific fecundity, total number of adults emerged on the same day were kept separately in oviposition wooden cage for oviposition. Number of eggs laid on subsequent days was recorded. The observations on fecundity were continued till all the females died. The female birth was calculated according to the sex ratio. Life tables were constructed according to the methods of (11, 12, 13). Stable age distribution was worked out by observing the population schedule of birth rate and death rate (m_x and l_x) when grown in limited spare.

Results and Discussion

The data on (Table-1) comparison of different parameters of life table constructed on different hosts indicated that the net reproductive rate (R_0) of *C. zastrowi sillemi* on mustard aphid (*L. erysimi*), maize aphid (*R. maidis*), cotton aphid (*A. gossypii*), cabbage aphid (*B. brassicae*), coriander aphid (*H. coriandri*), cotton mealy bug (*P. solenopsis*) and eggs of *C. cephalonica* was 66.81, 85.27, 88.06, 74.34, 68.05, 59.73 and 77.11, respectively. Thus,

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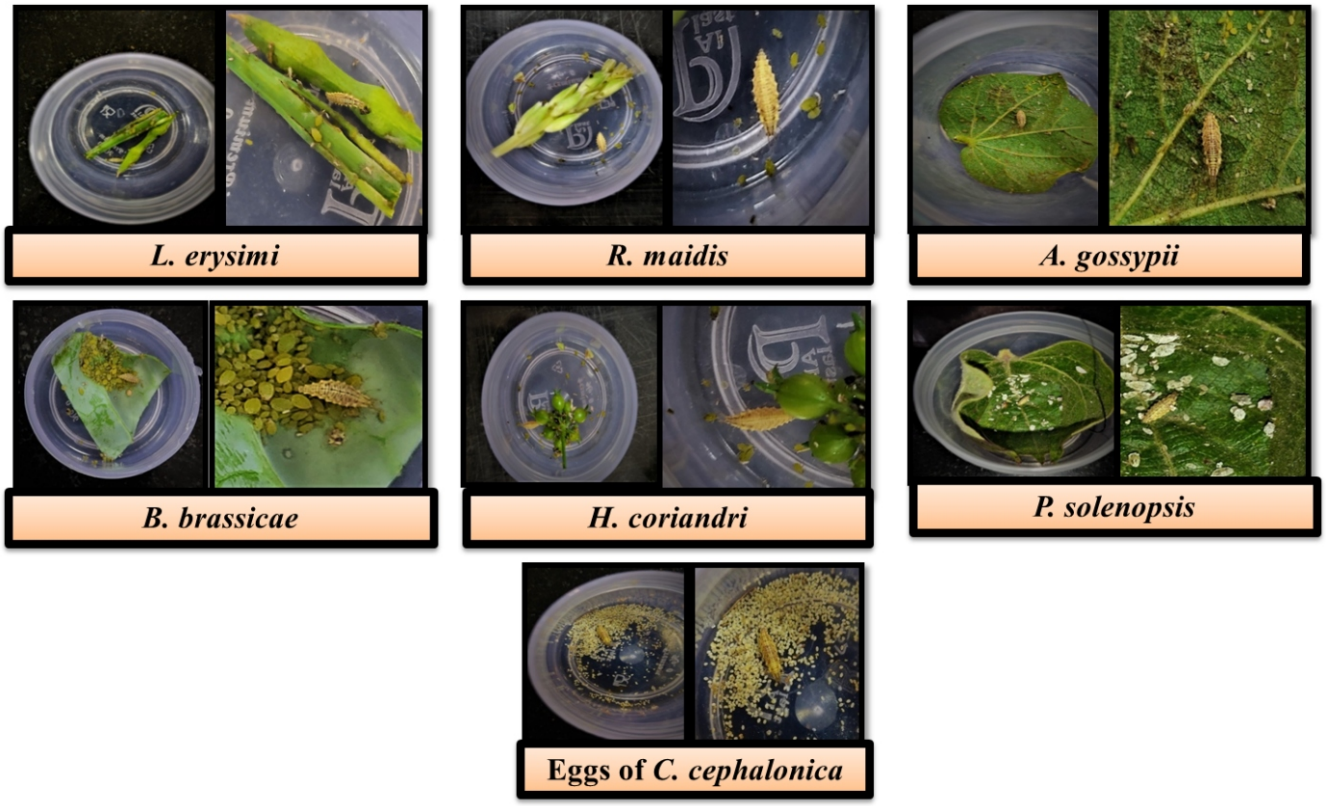
Table-1 : Comparative performance of different hosts on the basis of life table parameters of *C. zastrowi sillemi.*

Sr. No.	Growth statistics	Calculated values						
		L. erysimi	*R. maidis*	*A. gossypii*	*B. brassicae*	*H. coriandri*	*P. soleno-psis*	*Eggs of C.cephal onica*
1.	Net reproductive rate (R_0)	66.81	85.27	88.06	74.34	68.05	59.73	77.11
2.	Innate capacity for increase in numbers (r_m)	0.0958	0.1025	0.1023	0.0974	0.0989	0.0978	0.1028
3.	Generation time (T) (days)	41.36	41.24	41.31	41.51	40.39	39.78	39.18
4.	Finite rate of increase in numbers ( ) (Females/female/day)	1.1069	1.1138	1.1145	1.1094	1.1102	1.1083	1.1173
5.	Weekly multiplication of population ( ) (times/week)	2.0762	2.1266	2.1355	2.0679	2.0784	2.0535	2.1732



Life table of *C. zastrowi sillemi* on seven different hosts

on the basis of the net reproductive rate, the hosts can be categorized as; cotton aphid > maize aphid > eggs of *C. cephalonica* > cabbage aphid > coriander aphid > mustard aphid > cotton mealy bug. This variation may be due to food effect. The pattern of female birth (m_x) was almost similar on all hosts. The mean length of generation also differed on these hosts (Table-1). It was maximum on cabbage aphid (41.51 days) and minimum on eggs of *C. cephalonica* (39.18 days). The innate capacity of increase in number (r_m) was ranged from 0.0958 to 0.1028. Considering the values of the 'r_m' the descending order of hosts for *C. zastrowi sillemi* was: eggs of *C. cephalonica* (0.1028), maize aphid (0.1025), cotton aphid (0.1023), coriander aphid (0.0989), cotton mealy bug (0.0978), cabbage aphid (0.0974) and mustard aphid (0.0958). The finite rate of increase was worked out as 1.1069, 1.1138, 1.1145, 1.1094, 1.1102, 1.1083 and 1.1173 females per female per day on mustard aphid, maize aphid, cotton aphid cabbage aphid, coriander aphid, cotton mealy bug and eggs of *C. cephalonica*, respectively. More or less similar observations have been made by (4) who reported that it has been influence of different host insects (prey) on biological parameters of *C. zastrowi sillemi.* Similarly, (14) *revealed that the net reproductive rate, approximate generation time and innate capacity of natural increase of C. zastrowi sillemi* were 80.83 female eggs per female,

42.29 days and 0.103, respectively. The true intrinsic rate of increase (rm) on *B. brassicae* was found to be 0. 1098. (13) also found more or less similar results on coriander aphid. According to Mhaske, *et. al.* (2018), they observed that the net reproductive rate (R_0) to the tune of 136.31, 63.26 and 31.088 females per female per generation, the mean length of generation time (T) to the extent of 33.20, 35.75 and 35.07 days, innate capacity for increase in numbers to the tune of 0.1480, 0.1160 and 0.0980 female per female per day and finite rate of increase in numbers ( ) to the extent of 1.16, 1.12 and 1.102 females per female, were recorded in respect of *C. z. sillemi* when reared on second instar nymphs of *A. gossypii*, *P. solenopsis* and *M. hirsutus*, respectively.

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