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STUDY OF OVIPOSITION IN CARYEDON SERRATUS ON PHASEOLUS VULGARIS

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ABSTRACT Control of insect pest is a serious problem, as the use of different chemical pesticides to control them is injurious to human health and environment. Thorough knowledge of their biology is quite important to manage them. During present investigations oviposition in Caryedon serratus have been observed on Phaseolus vulgaris for the first time. The female C. serratus preferred to lay eggs near the depression as convex surface of the seed of P. vulgaris. Maximum number of eggs per seed was 15. Maximum egg laying occurred during the first 6-days of oviposition under all three temperatures (25C, 28C and 34C). The peak of egg laying occurred on 3-day at 25C and 34C, however, it occurred on 5-day at 28C. C. serratus prefer laying eggs in the depression, may possibly be due to two reasons, first, the seed coat may be weakest at this point, second, eggs laid in depression may be protected. Most of egg laying activity by day-6, helps the female to conserve its energy for greater longevity.

KEYWORDS : oviposition, Caryedon serratus, eggs

Introduction:

There is a continuing need to increase food production particularly in developing countries. One practical means of achieving the goal is to minimize the pest associated losses of stored seeds. Several types of insect pests damage the stored seeds and use of different chemical pesticide is very common to control them. Massive application of pesticide result in adverse effect on the beneficial organism, leaves pesticide residues in the food and results in environmental pollution (Zettler and Cuperus, 1990; Glenn et al., 1994; Ewete et al., 1996; Talukder and Howse, 2000). Due to the environmental activism and public pressure, the chemical control of pests is under increasing pressure. Although the benefits to agricultural products from the pesticide use to prevent insect associated losses cannot be overlooked, still there is a greater need to develop alternative. As a result, management of the pest rather than their destruction became a more acceptable approach. Which would allow a rational use of pesticides and provide adequate protection of the stored seed for sustainable food and feed. By getting the thorough knowledge of the biology of different pests, they can be managed without their destruction.

Study of the pattern of oviposition in insects has proved to be rewarding in respect of their fecundity and the potential of the population increase. Moreover, knowledge of the factors influences the total egg production is quite important. Oviposition on some members of family Bruchidae have been observed by different workers (Credland, 1990; Seck, 1993; Johnson and Siemens, 1995; Ofuya and Credland, 1995; Elhag 2000; Appleby and Credland, 2003; Park et al., 2003; Sundria and Kumar, 2004; Chawla and Thind, 2006; Sakhare et. al. 2018; Oaya, 2020; Sharma *et.al*. 2021). Less work has been done on *C. serratus,* these were some of the impelling reasons to taken up this study. During present investigations oviposition of *Caryedon serratus* have been observed on *Phaseolus vulgaris*.

Materials and Methods:

Initial supply of *C. serratus* was obtained from culture maintained on *Tamarindus indica* in laboratory. Stock culture was kept in glass trough (25 / 13cm.) covered with muslin, in a BOD incubator at 28C 2 RH-70%. Observation on oviposition were made on seeds of *P. vulgaris* in three experimental batches, first groups at 25C 2: RH-50% in A BOD - incubator, other groups were maintained at 28C 2: RH-70% in another incubator and third set of observation was made at room temperature (34C 5: RH-73 5%) during June - July. For observing the pattern of oviposition mated females were exposed to artificial light for 12 hours (from 8am to 8pm) and allow to lay eggs on the seeds of the *P. vulgaris* in a 'cage'. Frequent observations were made to ascertain the time of commencement of oviposition. The total duration of egg laying and its daily pattern was noted by observations at an interval of every 12 hours. Seeds with eggs regularly replaced with fresh ones. This procedure was carried on until the female completely stopped egg laying.

Results:

The seeds of P. vulgaris have a small depression almost in the middle of the seeds. The female C. serratus preferred to lay eggs near the depression as well as the convex surface of the seed (plate 1). The maximum number of eggs laid on a single seed was 15 (plate 2). Duration of oviposition, number of eggs/female and rate of oviposition are summarized in table I.

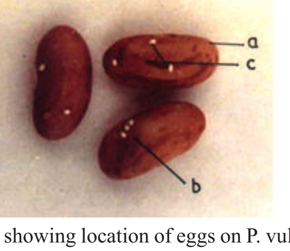

Plate 1: Photograph showing location of eggs on P. vulgaris seed (a = seed, b = depression, c = eggs)

Plate 2: Photograph showing increased no. of eggs on singly available seed of P. vulgaris. and relative humidity.

Note: Figures within parenthesis, on top of column, indicate the number of females used for each set of observations.
T1= 252C: RH = 50%; T2= 28 2C: RH = 70%; T3 = 34 5C: RH = 73 5%.

Daily/weekly pattern of oviposition: The peak in egg laying occurred on 3-day at 25C and 34C It, however, it occurred on 5-day at 28C. It was on 2.01.732 0n -day at 25C and declined gradually to the lower level of 0.40 0.547 on the last day (10-day) (Table 2, Fig. 1).

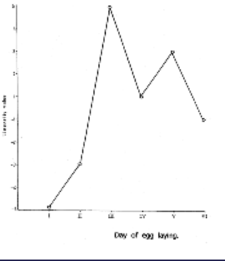

Fig 1: Trend of oviposition in C. serratus on P. vulgaris during the first 6 days of oviposition

at T1= 252C: RH = 50%; T2= 28 2C: RH = 70%; T3 = 34 5C: RH = 73 5%. At 28C peak in egg laying came about on 5-day (5.8 5.118). Thereafter, it declined to the lowest level of 0.60 1.341 on the last day (17-day) (Table 2, Fig.1). At 34C on 3-day 3.40 eggs 0.547 were laid. It gradually decreased to the minimum level of 0.40 0.547 on 10- day (Table 2 Fig. 1). By 3-day oviposition, 40%, 16.40% and 62.77% eggs were laid at 25C, 28C and 34C respectively. The maximum egg laying occurred during the first 6 days of oviposition under all three temperature (table 3).

Table 2: Eggs laid/female on P. vulgaris on different days of oviposition.

Sr. No.	Day of egg laying	T1 (5)	T2 (5)	T3 (5)
1.	I	0.20 0.447	0.40 0.894	0.60 0.89
2.	II	1.141	2.236	1.6 1.140
3.	III	1.732	2.8 2.588	3.4 0.547
4.	IV	1.2 1.788	3.8 1.095	0.60 0.894
5.	V	-----	5.8 5.118	0.80 1.303
6.	VI	0.40 0.547	2.8 3.033	1.4 0.547
7.	VII	0.80 1.303	0.60 0.894	----
8.	VIII	1.4 1.341	1.2 1.303	0.20 0.447
9.	IX	0.60 0.894	2.8 3.033	0.40 0.547
10.	X	0.40 0.547	2.8 3.033	----
11.	XI	----	0.20 0.447	----
12.	XII	----	----	----
13.	XIII	----	2.2 1.483	----
14.	XIV	----	0.40 0.894	----
15.	XV	----	1.8 2.489	----
16.	XVI	----	0.80 1.303	----
17.	XVII	----	0.60 1.341	----

Discussion:

A few reports have been given by previous workers about the oviposition in C.serratus on different hosts (Belinski and Kugler 1978; Pajni and Man, 1979; Ali-Diallo and Huignard, 1993; Chawla and Thind, 2006). During present work Phaseolus vulgaris have been used for the first time to observe the oviposition.

Ovulation and oviposition are two different activities while ovulation may occur at a certain rate under certain conditions of hormonal and physiological balance, oviposition may fail to occur in the absence of mating. This appear to be the case in C. serratus where no ovulation occurred in the females which were not allowed to mate. The present information confirms findings of Chawla and Thind (2005). Further non availability of specific host seed seriously hampers with the egg laying process. This indicates that initially mating primes and prepare the females for egg laying but subsequently, the attraction from the host seed help in the release of the egg in C. serratus.

When only one seed is provided to ovipositing female the maximum number of eggs was 15. but when the host seeds were available in plenty, generally one or two eggs per seed were laid. Gokhlale and Srivastava (1975) considered this owing to the repellent effect of the eggs on oviposition, a quantitative factor, which increases with rise in egg density in the individual seed. It would therefore suggest that female takes cognizance of the egg density per seed, which in turn ensures proper developmental opportunity. Thus, when several eggs are laid on a single seed, it is the compulsion of the nonavailability of sufficient number of seeds that forces the female to use the very limited surface area of the seed available, overriding the repellent effect of the eggs already laid.

C. serratus appears to prefer laying eggs in the depressions on the seeds. This may possibly be due to two reasons. First, the seed coat may be weakest at this point. Second, eggs laid in depression may be more easily fastened on to the substratum and be protected from accidental injuries. Hence, this may be an adaptation for better protection/ survival of the eggs.

Maximum oviposition occurs at 28C: RH 70% this rate was lower at both 25C: RH 50% and 34C: RH 73%. Temperature rising 25C to 28C postpones the day of peak of egg laying and a rise from 28C to 34C prepones it. Present work indicated peak of egg laying on day -3 at 34C: RH 73%, about 60% egg laying occurred by this time. It also showed 70% egg laying was day -6 of oviposition. It would, therefore, mean most of the egg laying activity by day -6, helps the female to conserve its energy for greater longevity. Belinsky and Kugler (1978) also reported maximum egg laying potential of C. serratus up to day –6 of oviposition.

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