

To Studies on Biology of Hadda Beetle, *Henosepilachna vigintioctopunctata* on Brinjal

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ABSTRACT

The present study was conducted to find out biology of hadda beetle, *H. vigintioctopunctata* on brinjal during Rabi, 2017-18 in laboratory Department of Entomology, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner. The hadda beetle was passes through four grub instars. The duration of first, second, third and fourth nymphal instars were 1.9 ± 0.3 , 2.4 ± 0.49 , 3.2 ± 0.4 and 4.2 ± 0.75 days, respectively and pupal duration was 4.4 ± 1.02 days. The adult male and female longevity was 27.5 ± 1.68 and 30.5 ± 2.16 days. The pre-oviposition periods of hadda beetle was 3.1 ± 0.54 days, and fecundity of hadda beetle 69.8 ± 19.42 days respectively.

Keywords: Biology, *H. vigintioctopunctata* and Brinjal

I. INTRODUCTION

Brinjal (*Solanum melongena* L.) is an important vegetable crop of tropical and subtropical region. It is also known as eggplant and aubergine, belonging to the family Solanaceae. The immature tender fruits are used as vegetables, pickle making and dehydration in industries. Cooked vegetables are prepared in various ways. It has many medicinal properties. It is common belief that white brinjal is good for diabetic patients. It can also cure tooth ache when fried, brinjal fruit cooked in til oil acts as excellent remedy for those suffering from liver complaints. Nutritionally, eggplant is low in fat, protein and carbohydrates. It contains good amounts of many essential B-complex groups of vitamins such as pantothenic acid (vitamin B₅), pyridoxine (vitamin B₆) and thiamine (vitamin B₁), niacin (B₃). Beetles are metallic brown in colour and usually have 7-14 black spots on each elytron with somewhat pointed abdominal tip. The larvae confine their attack to the lower surface while adult beetles usually feed on the upper surface of the leaves. (Pradhan et al., 1990; Khan et al., 2000).

II. MATERIAL AND METHODS

To initiate experiment on the biology of hadda beetle, culture was multiplied in the laboratory from field collected grubs. Brinjal twigs were taken from field and the cut end of the twig was plugged with cotton which was transferred to white mouth plastic jar of size (22.5 × 30.0) cm having window holes fitted with mosquito net were made on the side wall opposite each other. Field collected mature grubs were transferred to the brinjal twigs until pupation and adult emergence. After emergence of the adult pair of males and females were collected from this jar and transferred to plastic box of size (12 × 25) cm and depth 10 cm. Brinjal leaves collected from unsprayed brinjal plant with its petiole plugged with moist cotton was kept in petri dish which was further transferred to the rearing box. The adults were allowed to lay eggs on the brinjal leaves. The eggs were further used for study of the life cycle. The eggs were kept in double layer of leaf in a petri dish and high humidity was maintained by putting a moist cotton swab in the centre of same petriplate. Observations were also done on feeding behavior of grubs and beetles as well as on pronotal and elytral spots of male and female beetle.

III. RESULTS AND DISCUSSION

The biology of the *H. vigintioctopunctata* was studied under laboratory conditions at COA, SKRAU Bikaner. Results on different developmental stages of *H. vigintioctopunctata*.

Egg: The female lay on an average 69.8 numbers of eggs with minimum 40 and maximum 105. Eggs were orange yellow deposited in batches of 2-5 usually on the ventral surface of the leaf. In each batch the number of eggs varied from 35 to 65. The mean oviposition period was 2.9 ± 0.7 days with range from 2 to 4 days while the pre-oviposition period ranged between 2 and 4 days. Just before hatching the fertilized egg turned black. The present results are in conformity with that of Ramzan et al. (1990) who reported that pre-

oviposition and oviposition period of hadda beetle on brinjal was 8.00 and 12.70 days and the maximum average number of eggs laid by a female were 269, similarly Nagiaet al. (1992) reported that female beetle laid 147.40 ± 23.48 eggs on brinjal plants.

Grubs: The newly hatched grubs were yellowish with average length 1.31 mm. These neonate grubs initially remained attached to the egg cell and later on spread out on the leaves. The duration of 1st instar was 1.9 ± 0.3 days. The second instar grubs were also yellowish colour measured 2.25 mm in length and rows of spines were visible under lens. The duration of 2nd instar was 2.4 ± 0.4 days with range 2 to 3 days. The third instar grubs were bright yellow, elliptical and rows of branched spine over the body surface were quite prominent found actively feeding on the epidermal layer of the leaf. The average duration of 3rd instar grub was 3.2 ± 0.4 days with range 3 to 4 days. The 4th instar grub on an average measured 6.28 mm in length, bright yellow in colour and rows of branched spines were distinctly visible in naked eyes. The length of this instar varied from 3-5 days with mean duration 4.2 ± 0.75 days. Our findings are in conformity with Kaur and Mavi (2005) who reported that the time taken for first, second, third and fourth instar grubs were 3-4, 2-4, 2-4 and 2-5 days with an average of 3.5, 3.1, 2.7 and 3.5 days, respectively. There were four grub instars of *H. vigintioctopunctata*, which successively lasted for 2.20 ± 0.40 , 3.60 ± 0.66 , 5.70 ± 0.46 and 4.10 ± 0.54 days. Verma and Anandhi (2008) reported that the average duration of 1st, 2nd, 3rd and 4th instars varied from 2.6 ± 0.48 , 2.9 ± 1.04 , 2.5 ± 0.50 and 6.8 ± 1.94 days. Our findings are in conformity with Hossain et al. (2008) who reported that the grubs completed 4 instars within 11.30 ± 0.48 days. The duration of 1st, 2nd, 3rd and 4th grub instars was 2.25 ± 0.13 , 3.25 ± 0.08 , 2.55 ± 0.15 and 3.25 ± 0.12 days, respectively.

Pupal stage: The grub stop feeding for a day or two and transformed to pupa which remained attached below the surface of the leaf. The skin of the pupa was actually formed with the shed off skin of last instar grub and looked half of the body with

spinous integument and half with smooth surface. The pupal period lasted for 3 to 6 days with average 4.4 ± 1.02 days. Our results are in similar line with the findings of Ramzan et al. (1990) who also observed that pre-pupal and pupal period extended for 2.5 and 5.5 days, respectively. Similarly, Nagiaet al. (1992) also reported that pupal period of 4.65 ± 0.49 days. Ram and Verma (1998) recorded the pre-pupal and pupal period from 1-3 and 4-10 days, respectively. Our results are also in conformity with the findings of Patel and Purohit (2000) who reported pupal period 4.10 ± 0.30 days on brinjal. Similarly, Kaur and Mavi (2005) observed the mean pupal period of 4.10 ± 0.54 days. Verma and Anandhi (2008) also recorded that the pupal period ranged from 3-6 days with an average of 4.60 ± 0.9 days.

Adult: The adult emerged after 23 to 25 days of egg laying. Dark orange to reddish orange adults were formed from the pupa having black spots and the body was hemispherical. Males were slightly smaller than the females in size. Males and females started fertilization shortly after emergence from pupae and the mating continued for 25 minutes to 45 minutes and repeated 2-3 times. Both male and female were found consuming the epidermal layer of the undersurface of the leaf producing characteristics ladder like appearance. Our findings are in conformity with results obtained by Ramzan and Singh (1982) who reported that hadda beetle completed its life cycle in 26.3 days on brinjal. Ram and Verma (1998) revealed that the life cycle of hadda beetle was completed in 17-41 days on brinjal. Ghosh and Senapati (2001) also reported that the life cycle duration was shortest (26.74 days) during June-July and longest (33.52 days) in September-October on brinjal. The longevity of male was found 27.5 ± 1.68 days while in case of female 30.5 ± 2.16 days. On an average the adult longevity varied from 25 to 35 days. Similar observations have also been recorded by Qamar et al. (2009) who observed that the male longevity ranged from 41-69 days with an average of 57.2 ± 7.12 days, whereas, female longevity was 45-76 days with an average of 60.80 ± 9.73 days.

Table 1 Biology of hadda beetle, *H. vigintioctopunctata* on brinjal

S.No.	Stage of development	Duration (days/Nos.)	Range (days/Nos.)
01	Egg	2.9 ± 0.7	2-4
02	Grub -a. Instar 1	1.9 ± 0.3	1-2
	b. Instar 2	2.4 ± 0.49	2-3
	c. Instar 3	3.2 ± 0.4	3-4
	d. Instar 4	4.2 ± 0.75	3-5
03	Pupa	4.4 ± 1.02	3-6

04	Adult longevity a. Male	27.5±1.68	25-30
	b. Female	30.5±2.16	27-35
05	Pre oviposition period	3.1±0.54	2-4
06	Fecundity	69.8±19.42	40-105

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