Indian J.Sci.Res. 13 (1): 199-203, 2017

ISSN: 0976-2876 (Print)
ISSN: 2250-0138 (Online)

BIOLOGY AND LIFE CYCLE OF *Henosepilachna vigitioctopunctata* FABRICIUS, A SERIOUS DEFOLIATOR OF BITTER GOURD (*Momordica charantia*) IN JAMMU REGION (JAMMU & KASHMIR) INDIA

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ABSTRACT

***Hensoepilachna vigintioctopunctata* (Fabricius), commonly known as Hadda beetle, is a polyphagous pest of various economically important agricultural crops in India. It is a serious pest of cucurbit crops, especially, bitter gourd (*Momordica charantia*). *Hensoepilachna vigintioctopunctata* underwent holometabolous development and the studies on its biology indicated that a gravid female laid 200- 370 eggs on an average in 6-7 batches during her life span. The duration of different stages of life cycle viz. eggs, larvae and pupa lasted for an average of 8±2.23 days, 25.5±10.41 days and 4±0.79 days, respectively. The adult male and female survived for an average period of 23±1.58 days and 30±1.49 days, respectively. The whole body of the adults is covered with fine short hairs. Adults are copper brown coloured mottled with black spots.**

KEYWORDS: *Henosepilachna vigintioctopunctata, Momordica charantia,* Biology and Life Cycle.

Cucurbits, belong to Family Cucurbitaceae, constitute the largest group of summer vegetables grown all over the world. Bitter gourd is the most popular crop of the cucurbitaceae family grown in low and mid-hills of Jammu & Kashmir. Fruit juice of bitter gourd is used as a traditional medicine to cure diabetes and also used to treat acidity, indigestion, constipation and ulcers. Its seeds are also powerful antihelminthics. Bitter gourd is infested with a variety of insect pests right from the primordial stages of the crop to harvest of the products. Besides the direct damage, many pests act as vector for viruses. Insect pests of cucurbits of serious concern are Red pumpkin beetle, Fruit flies and Melon ladybird beetles. (Gupta 2004).

Hensoepilachna vigintioctopunctata (Fabricius) or melon ladybird beetle or spotted leaf-eating beetle, belongs to the Family-Coccinellidae or ladybird beetles, of Order- Coleoptera. *Hensoepilachna* is an oligophagus, multivoltine, coccinellid beetle, infesting crops in mid-hills and plains of India (Kumar and Kumar 1998). Both grubs as well as adult beetles feed voraciously on the green matter of the leaf and skeletonize it leaving the upper epidermal tissue intact (Rath *et al*., 2002; Mohasin and De, 1994).

MATERIALS AND METHODS

In order to study the lifecycle of melon ladybird, the adults were collected from the fields of cucurbits, by using entomological nets, during the months of June-July, and were kept in rearing cage, under laboratory conditions. They were continuously fed on the leaves of cucurbits (bitter gourd). The adults were allowed to copulate and each pair was observed for pre-mating, mating and oviposition behavior and duration. The adult female laid eggs in batches. Eggs were counted and after hatching the grubs were reared and the morphometric measurements for each instar were recorded. Observations regarding the pre-pupal and pupal stages and adult longevity were also recorded. Data gathered during the experiment was analyzed statistically for calculating mean, standard deviation and standard error.

RESULTS AND DISCUSSION

Distribution

The genus *Hensoepilachna* is a serious pest of many agricultural crops and has been reported from Australia, Africa, Asia, Afghanistan, America, China, Middle East, Siberia and Sri Lanka (Jamwal *et al.,* 2013). It has also been recorded from the regions of Jammu and Kashmir, Punjab, Himachal Pradesh, Uttar Pradesh, Bengal and Karnataka (Shankar *et al.,* 2010; Jamwal *et al.,* 2013). It has been recorded from Rajouri, Kalakote, Nowshera and Sunderbani areas of Jammu division. (Sudan, 2013).

Hosts

Henosepilachna vigintioctopunctata has been recorded as a serious pest of brinjal, cucmber, gourds, pumpkin, melon, tobacco and tomato in Jammu and Kashmir and other parts of the country (Ahmad *et al.,* 2001; Rath, 2005). It has also been reported on some medicinal plants such as *Datura innoxia* Mill., *D. stromonium*, *Solonum nigrum* L., *Physalis minima,*

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Withania sominfera and *Amaranthus caudatus* L. (Jamwal *et al.,* 2013; Sudan, 2008; Wilson, 1989).

LIFECYCLE OF *Henosepilachna vigintioctopunctata*

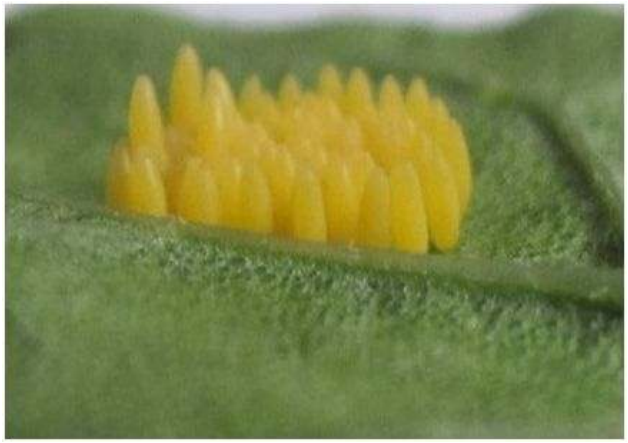
Mating and Ovipostion

With the onset of warm weather, the adult beetles can be seen in the fields flying and feeding. Mature adults start mating after 2-3 days of emergence. A pair copulates several times and each copulation lasts for approximately 1-3 minutes.

A gravid female lays about 200-370 eggs (average 285±66.48 eggs) in 4-6 batches during her life span, on the underside of the leaf. Similar, observations were recorded by Tyade and Simon (2013), they observed the fecundity rate of *Epilachna vigintioctopunctata* between 211 to 328 eggs during life span.

Eggs

Freshly laid eggs are pale-yellow to orange-yellow, elongated, usually in clusters of 5 to 45. An egg is approximately 1.3mm in length and 0.6mm in width. Under laboratory conditions the incubation period varied from 5 to 11 days with an average of 8±2.23 days. The incubation period of *Epilachna vigintioctopunctata* was observed as 5.3 days on brinjal, by Varma and Anandhi (2008) figure 1.



Figures 1: Freshly laid eggs of *Henosepilachna vigintioctopunctata*

Larva

Newly hatched larvae or grubs are approximately 1.6mm in length and light yellow in color. Larvae are soft bodied and covered with six longitudinal rows of stout branched spines on the back. At first the spines are yellow, but later become darken on the tips, and thus more conspicuous. Larva molts four times during the development. Mature larva is approximately 6.0-7mm in length. The average duration of the 1st, 2nd, 3rd and 4th instar was recorded as 2.5±1.17 days, 4.5±1.92 days, 5.5±2.86 days and 5±2.23 days respectively. During their earlier stages the grubs are gregarious in nature but as they grow older they tend to split into smaller groups (figure 2& 3).

Figure 2: Newly hatched 1st instar

Figure 3: Later stage instar grubs

Prepupa

Fully grown 4th instar grubs gradually stop feeding and spend about 1-3 days in pre-pupal stage. The average pre-pupal length and breadth recorded as 5.16±0.57 mm and 2.87±0.40 mm, respectively, by Tyade and Simon (2013).

Pupa

Pupation occurs when mature larvae aggregate and attach themselves, by the posterior end of their

bodies, to the underside of the leaves or stem. Larvae pupate in this position. During pupation the larval skin is pushed backwards from the thorax towards the abdomen, where it remains as a whitish, wrinkled mass. It ceases its motion and pupates. Pupa is yellow, spineless, and of the same size and shape as of the adult. The pupal period lasts for 3-5 days with an average of 4±0.79 days. Similar results were obtained by Verma and Anandhi (2008) and Qamar *et al.,* (2009) figure 4.

Figure 4: Pupa

Adult

The adult is oval in outline, about 6-7mm in length. Newly emerged adult is straw or cream-yellow in color and shortly after emergence, 28 black spots of variable size appear on the dorsal side. The whole body is covered with fine short hairs. Adults darken with age and finally attain orange brown color with a bronze tinge. Adult males are slightly smaller in size than adult females (figure 5).

Figure 5: Adult Hadda beetle

The adults start feeding a day after emergence. The longevity of adult male and female was recorded as 21 to 25 days and 28 to 32 days with an average of 23±1.58 days and 30±1.49 days respectively. Ghosh and Senapati (2001) recorded that *Henosepilachna vigintioctopunctata* was found active from April to middle of the October and second highest population (8-14 beetle/plant) was recorded during middle of September.

Nature of damage

Henosepilachna vigintioctopunctata is a serious pest of cucurbits especially *Momordica charantia* (Bitter gourd). Both adults and larvae(grubs) are often found on the lower surfaces of the leaves, scrapping and feeding voraciously on the parenchyma and the lower epidermis between the veins and skeletonize it in a characteristic manner leaving intact the upper epidermis as well as the tougher tissues (veins, etc.) in the form of "window".

The affected leaves become translucid, take a grayish color and dry up. In cases of severe attack, the young plant can dry up completely and die. Adults are fliers can damage large crop areas during their peak activity (Nagia *et. al.* 1992). The adults are not responsible for as great level of injury as are the larvae (figure 6).

Figure 6: Damage pattern of *Henosepilachna vigintioctopunctata* on bitter gourd leaves

Table 1: Duration of different stages in the life cycle of *Henosepilachna vigintioctopunctata* (Fabricius, 1775)

Stage	Duration in days		mean±SD
	Min.	Max.	
Incubation period	5	11	8±2.23
Larval instars			
1st instar	1	4	2.5±1.17
2nd instar	2	7	4.5±1.92
3rd instar	2	9	5.5±2.86
4th instar	2	8	5±2.23
Total larval period	**12**	**39**	**25.5±10.41**
Prepupal period	1	3	2±0.79
Pupal period	3	5	4±0.79
Adult longevity			
Male	21	25	23±1.58
Female	28	32	30±1.49

ACKNOWLEDGEMENT

The authors are greatly thankful to Professor Roopma Gandotra, Head, Department of Zoology, and University of Jammu for providing necessary facilities to work.

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