

Original Research Article

Biology of *Leucinodes orbonalis* Guenee on Brinjal in Laboratory Condition

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ABSTRACT

Keywords

Biology, Egg,
Larva, Pupa,
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Laboratory experiment was conducted during *Kharif* 2009 and 2010 at Department of Entomology, Vasantnao Naik Marathwada Krishi Vidyapeeth, Parbhani (Maharashtra) to study biology *Leucinodes orbonalis* Guenee on Brinjal under laboratory condition. The experiment was carried out for three generations. The pests occupied average life cycle of 34.45 days shared by 4.80, 12.20, 2.12, 10.03 and 5.30 days incubation, larval, prepupal, pupal and adult duration respectively.

Introduction

Brinjal or Baingan (*Solanum melongena* Linnaeus) known as eggplant and aubergine in North America and Europe, respectively, is an important vegetable in India. It is native of India and locally called 'Wangi' in Maharashtra often described as poor man's vegetable. After potato, it ranks second highest consumed vegetable in India, along with tomato and onion. Brinjal is a good source of carbohydrates, proteins, vitamin A, B, C and minerals like iron, phosphorus and calcium. It has medicinal properties also (Choudhari, 1967). Though perennial vegetable, it is grown as a seasonal crop throughout the country. The crop suffers due to whitefly (*Bemisia tabaci* Gennadius), aphid (*Aphis gossypii* Glover), jassid (*Amrasca biguttula biguttula* Ishida), thrips (*Thrips tabaci* Lindemann), epilachna beetle (*Henosepilachna vigintiocto punctata*

Fabrcius), mites (*Intranychus macfuslanii* Baker and Pritchaid) and shoot and fruit borer (*Leucinodes orbonalis* Guenee). Of these brinjal shoot and fruit borer, *L. orbonalis* is serious throughout the country. Damage of the borer starts in nursery before transplanting and continues upto harvest. It infests young shoots which limits the ability of plants to produce healthy fruit bearing shoots thereby reducing potential yield. It bores into fruits making them unmarketable. Infested fruits often show holes plugged with excreta. The shoot and fruit damage may reach 70 per cent (Lal, 1964). Damaged fruits show 68 per cent reduction in ascorbic acid (Hami, 1995). Overall losses due to insect pests vary from 26.3 to 65.5 per cent (Gangwar and Sachan, 1981) with a maximum of 95.8 per cent (Akhtar and Khawja, 1973). Biology indicates population

growth duration of insect pests. They provide duration of different stages of pest species under given set of climatic conditions which forms sound ecological base for pest management practices.

Materials and Methods

The laboratory culture of *L. orbonalis* was initiated by collecting infested fruits of brinjal from field. The larvae were reared individually in 5 x 5 cm plastic containers by providing them with fresh pieces of brinjal fruits daily in morning, until pupation. The newly emerged male and female moths were placed in oviposition cage (plastic jars of 19 cm height and 21 cm diameter). The tender brinjal twigs with succulent leaves were placed in small conical flask containing water which served as a substrate for oviposition. The cotton swabs dipped in five per cent honey were placed in petridish at the bottom of cage to serve as food for emerging moths. The cage was covered with muslin. The freshly laid eggs thus obtained were used for laboratory investigations. The culture was maintained at ambient room temperature conditions. To study biology of *Leucinodes orbonalis* one hundred freshly laid eggs kept in five petri dishes each containing 20 eggs, constituted one replication. They were moistened with filter paper to induce hatching. Observations on per cent hatching and incubation period were recorded. Subsequently the newly hatched larvae were reared individually in plastic boxes on small cut pieces of brinjal, every day until pupation. The observations on larval duration, per cent larvae pupated, growth index, pupal duration and successful adult emergence were recorded. Thus egg to adult life cycle of *L. orbonalis* was determined. The adults emerged on the same day were paired and released for egg laying in oviposition cage. Five per cent honey solution was provided as food. Eggs laid per

female were counted daily till the oviposition ceased. The growth index was calculated by using formula,

$$\text{Growth index} = \frac{\text{Per cent larvae pupated}}{\text{Mean larval duration}}$$

Results and Discussion

Biology of *L. orbonalis* on Brinjal

The studies on the life cycle of *L. orbonalis* were carried out on brinjal during 2008-09 for three generation presented in (Table 1)

Incubation period

The mean incubation period in first, second and third generation was 4.2 ± 0.45 , 5.60 ± 0.55 and 4.6 ± 1.14 days, respectively with an average of 4.8 days and 4.2 to 5.6 days range.

The incubation period of 3-5 days (Patel and Basu, 1948), 4.87 days (Lall and Ahmad, 1965), 3-5 days (Mazumdar, 1970 and Lande, 1976), 3-4 days (Allam *et al.*, 1982), 4-5 days (Taley *et al.*, 1984) and 4-5 days (Jat *et al.*, 2003) was reported.

Larval period

The mean larval duration was observed to be 10.51 ± 0.21 , 14.03 ± 0.48 and 12.07 ± 0.43 days during first, second and third generation, respectively with an average of 12.20 days in the range of 10.50 to 14.03 days.

According to Allam *et al.*, (1982), Taley *et al.*, (1984), Yin (1993) and Singh and Singh (2003) the larval duration occupied 9 to 13, 10 to 20, 6 to 9 and 6.70 to 22 days, respectively. The mean larval duration was 10.37 ± 0.17 and 10.84 ± 0.41 days during

first and second generation, respectively (Bodkhe, 2004).

Pupal period

The mean pre pupal duration was observed to be 1.66 ± 0.28 , 2.40 ± 0.65 and 2.30 ± 0.27 days in first, second and third generation, respectively with an average of 2.12 days and a range of 1.66 - 2.40 days. The per cent pupation during three generations was 60.85 ± 3.65 , 65.00 ± 7.19 and 76.19 ± 4.33 , respectively, with 67.35 per average pupation in range 60.85 to 76.19 per cent range. The highest growth index of 6.31 was recorded in third generation. It was 5.80 and 4.63 in first and second generation, respectively. The pupal duration was 10.30 ± 0.76 , 8.59 ± 0.13 and 11.21 ± 0.60 days in first, second and third generation, respectively with an average of 10.03 days, and a range of 8.59 to 11.21 days.

The lowest adult emergence of 22.60 ± 4.88 , 67.69 ± 11.09 and 73.09 ± 2.14 per cent was observed in first, second and third generation, respectively with an average of 54.46 per cent and a range of 22.60 to 73.09. The pupal period 7 to 12, 10 to 13 and 8 to

15 have been reported by Taley (1984), Baang and Corey (1991) and Yin (1993). Bodkhe (2004) reported pre pupal and pupal duration of 1 to 3 days and 10 to 13 days. Adult emergence of 17.30 ± 9.22 per cent and 66.92 ± 20.41 per cent during first and second generation, respectively.

Life cycle

The mean life cycle (egg to adult) took 32.09 ± 0.66 , 36.61 ± 2.22 and 34.65 ± 0.92 days in first, second and third generation, respectively with an average of 34.45 days and a range of 32.09 to 36.61. The duration of life cycle occupied by female was 31.65 ± 0.71 , 34.80 ± 0.93 and 33.19 ± 1.15 days in first, second and third generation with an average of 33.21 days and a range of 31.65-34.80 days. The duration of male lasted for 30.21 ± 0.68 , 32.92 ± 0.83 and 32.80 ± 1.60 days in first, second and third generation respectively with an average of 31.98 days and a range of 30.21 to 32.92 days. Allam *et al.*, (1982), Jat *et al.*, (2003) and Bodkhe (2004) observed life cycle of 19 to 29 days, 20 to 34 days and 26 to 35 days, respectively, conforming the results of present investigation.

Table.1 Mean duration of life stages (days) of *L. orbonalis* observed in three generations

| Life Stages | First generation \pm SD | Second generation \pm SD | Third generation \pm SD | Average of three generation | Range |
|--------------------------|---------------------------|----------------------------|---------------------------|-----------------------------|-------------|
| Incubation period | 4.2 ± 0.45 | 5.60 ± 0.55 | 4.6 ± 1.14 | 4.8 | 4.2-5.6 |
| Larval period | 10.50 ± 0.21 | 14.03 ± 0.48 | 12.07 ± 0.4 | 12.20 | 10.50-14.3 |
| Pre pupal period | 1.66 ± 0.28 | 2.40 ± 0.65 | 2.30 ± 0.27 | 2.12 | 1.66-2.40 |
| Per cent pupation | 60.85 ± 3.65 | 65.00 ± 7.19 | 76.19 ± 4.33 | 67.35 | 60.85-6.19 |
| Pupal period | 10.30 ± 0.76 | 8.59 ± 0.13 | 11.21 ± 0.60 | 10.03 | 8.59-11.21 |
| Growth index | 5.80 | 4.63 | 6.31 | 5.58 | |
| Per cent adult emergence | 22.60 ± 4.88 | 67.69 ± 11.09 | 73.09 ± 2.14 | 54.46 | 22.60-73.09 |
| Female | 31.65 ± 0.71 | 34.80 ± 0.93 | 33.19 ± 1.15 | 33.21 | 31.65-34.80 |
| Male | 30.21 ± 0.68 | 32.92 ± 0.83 | 32.80 ± 1.60 | 31.98 | 30.21-32.92 |
| Life cycle | 32.09 ± 0.66 | 36.61 ± 2.22 | 34.65 ± 0.92 | 34.45 | 32.09-6.61 |

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