



SCAN ME

*Research Paper*

**ARTIFICIAL REARING METHOD OF THE LARVAE OF *Leucinodes orbonalis* GUENEE AND ITS BIONOMICS**

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**Abstract**

An artificial rearing of *Leucinodes orbonalis* Guenee is commonly known as Brinjal Fruit and Shoot Borer (BFSB). The present study of *Leucinodes orbonalis* Guenee is based on artificial rearing by using a synthetic diet and a natural diet – potato. A cage set-up has been developed with proper feeding with ambient temperature. Comparison of its developmental stages - Egg, Larva, Pupa, Adult. Morphometric observations of all development stages on potato tuber Egg length -  $0.59 \pm 0.045$  and duration 3 – 6 days, larvae duration 13 – 14 days, Male length -  $8.15 \pm 0.65$  duration 2 – 3 days, Female length -  $9.15 \pm 0.45$  duration 4 – 5 days. On the Synthetic diet, the length of larvae was slightly changed but the duration was extended for a day, and observed that the easiest way to rear *Leucinodes orbonalis* Guenee was in a natural diet on potato tuber than an artificial diet in a laboratory conditions.

Key words: *Leucinodes orbonalis* Guenee, Rearing techniques, artificial diet, biological parameters, morphometric, Potato, Developmental stages.

**INTRODUCTION**

*Leucinodes orbonalis* Guenee is commonly known as Brinjal fruit and shoot borer (BFSB) was importrayed by Guenee in 1854. *Leucinodes orbonalis* Guenee is essentially monophagous mainly on *Solanum melongena* Linnaeus (eggplant) belonging to the family Solanaceae is accounted for to be the pest of this plant (Muhammad *et al.*, 2018). The variability in their population, period of growth, fertility, duration and development of larvae at different stages can be related to changes in the ambient environment and the changes in abiotic component under agro-climatic conditions. *Leucinodes orbonalis* Guenee can cause various range of damage is 70 to 90 percent to brinjal *Solanum melongena* L. (Dhandapani *et al.*, 2003).

The damaging stage caterpillars are creamy white when young and turn light pink when fully grown (Lall and Ahamad, 1965). They bore into petiole and midribs of large leaves or young growing shoots, close the opening with their frass and feed within. As the growing points are damaged it leads to withered and dried off slender shoots in brinjal crops. During fruiting stage of the crop, caterpillars bore into flowers, buds, and fruits entering from under the calyx having no visible sign of infestation and feeding inside the fruits (Butani and Varma, 1976). Because of that the fruiting buds drop down while the fruits show circular exit holes. Such fruits lose market value and become unfit for human consumption (Niranjana and Sridhar, 2015).

The infestation of *Leucinodes orbonalis* larvae could be controlled by using bio-pesticides. The present study of *Leucinodes orbonalis* Guenee is based on the artificial cage of rearing by using a synthetic diet and natural diet in laboratory conditions with ambient temperature. The purpose of the artificial cage for the rearing of this insect pest is to know their appropriate developmental stages of life - egg, larva, pupa, and adult that can control their infection in crop field by using a different controlling method which results will increase the production of *Solanum melongena* Linnaeus (eggplant) in Vidarbha region. *Leucinodes orbonalis* is one of them and an efficient and effective laboratory-rearing technique is important to minimize crop damage and quality of vegetable production against an economically important insect pest, *Leucinodes orbonalis*. Artificial Cage rearing of insects is an important part of researching to achieve better management of insect pests.

## MATERIALS METHODS

The artificial cage set up for rearing was started with 20 to 30 larvae collected from infested brinjal fruit captured from brinjal crop field at Dongargaon in Nagpur district. By using potato tuber as natural diet compared with synthetic diet. The artificial cage set-up for rearing was done in controlled environment at temperature ( $27^{\circ} \pm 1^{\circ}$ ) which made up of corrugated box, wooden dust, net, plastic tray, table lamp for maintaining their temperature. Diet for larvae development used natural diet (potato tuber) and formulated synthetic diet.

### Cage set-up:

One fourth part of Corrugated box filled with wooden dust on that put plastic tray shown in (fig. 1) with diet of larvae.



Fig.1 Potato on tray

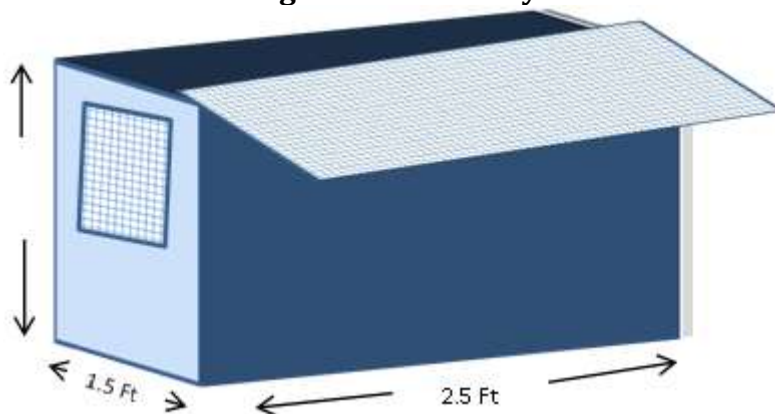


Fig.1.A. Diagrammatic View of Cage

### Diet of larvae

**Natural diet** - Fresh medium size potato tubers was peeled off and washed thoroughly under tap water to remove outer mud, dust etc. and soaked in formaldehyde solution for surface sterilization for 5 to 10 min and air dried. After that sterilization the potato by using 70% alcohol these potato placed on blotting paper in tray and collected larvae transferred on potato tuber according their size. After that the corrugated box covered with thin cotton cloth which prevent moth for moving outside from the box. The larvae move towards wooden dust for pupation till adult emergence. Once they emerged in adult stage transferred in translucent plastic jar for their pairing.

**Artificial diet** - Preparation of synthetic diet with some modification in the existing method which is used for larval development (Hegde *et al.*, 2018). Diet prepared by using kabuli gram powder. 62.5gm, L - ascorbic acid 1gm, Methyl hydroxyl benzoate (MPHB) 0.75, Sorbic acid 0.30gm, Bavistin 0.10gm, Ciprofloxacin tablet  $\frac{1}{2}$ , Supradyn tablet  $\frac{1}{2}$ , Vitamin - E 0.10ml, Formaldehyde Solution 5ml Agar 3.5gm and dry yeast 12gm in 250 ml Distilled water. Prepared some small size of cubes which put on tray in corrugated box leave for few days in controlled environment ( $27^{\circ} \pm 1^{\circ}$ ). After they move towards wooden dust for pupation and emerged in adult moth. Once they emerged they transferred in translucent plastic jar for pairing.

**Adult moth diet** – distilled water 500 ml, Alcohol 1ml, Supradyn tablet  $\frac{1}{2}$  , Vitamin – E 0.2 ml, Methyl hydroxyl benzoate (MPHB) 1gm, Sugar 100gm. Prepared well mixed solution of all contents and the cotton ball dip in solution. Dip cotton ball put in adult moth jar and top of the jar covered with thin black cotton cloth till ovulation period.

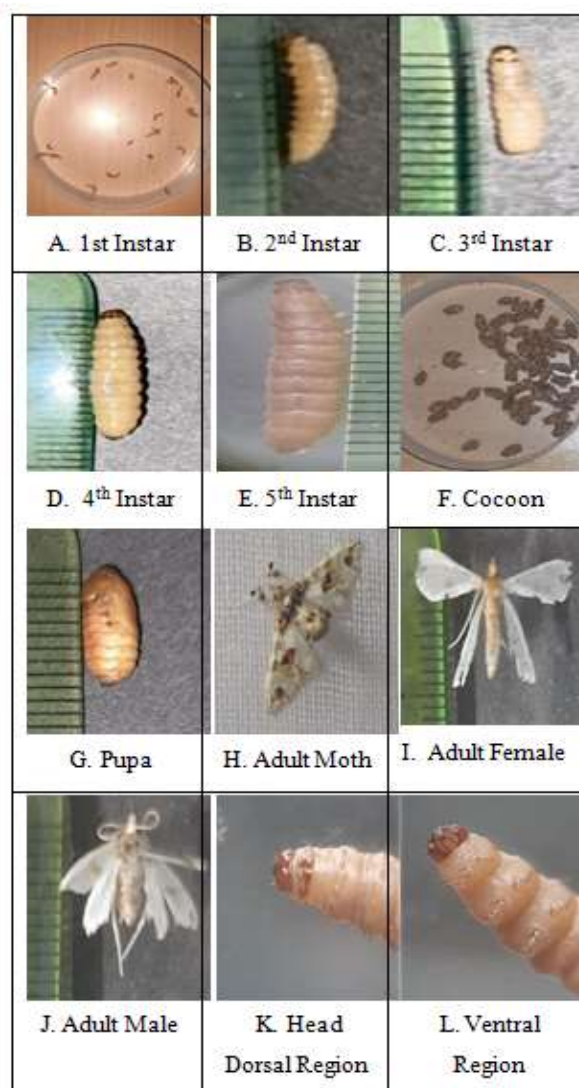
After ovulation period of both the diet moth on potato tuber and synthetic diet the part of moth eggs laying changed on every second day till the death of adult moth. Cut egg laying part of black cloth without damaging eggs and transferred in transparent jar placed on tissue paper in it. The jar covered tightly at  $(27^{\circ} \pm 1^{\circ})$  till hatching. The data studied on the basis of two different diet plan on *leucinodes orbonalis* guenee. Observed some differences in developmental stages – egg, larva, pupa, and adult.

## RESULTS AND DISCUSSION

The results of artificial rearing of *leucinodes orbonalis* guenee on the basis of natural diet (peeled potato) and formulated synthetic diet under laboratory conditions in ambient temperature  $(27^{\circ} \pm 1^{\circ})$ . Differences occurred in developmental stages of insect pest the egg lays pale yellow colored singly. According to diet of potato tuber the egg length mean  $0.59 \pm 0.045$  and duration 3 to 6 days. These observation correlated with earlier findings (Ambure *et al.*, 2016, Wankhede *et al.*, 2016, Jat *et al.*, 2003., Bindu *et al.*, 2013) and (Laneesha M and Mahapatro G. K. 2023) who observed under different laboratory conditions. On formulated synthetic diet the egg duration 4 – 7 days respectively.

The newly hatching dirty whitish larvae bore into potato and feed on synthetic diet and orderly developed till five instar with pink in colored matured larvae. (Ambure *et al.*, 2016). The length of larvae shown in (Fig. A, B, C, D, E) and total larval duration in natural diet on potato is 13 - 14 days (Rahman *et al.*, 2011) but the duration of larva period in synthetic diet 14 -15 days that means in formulated synthetic diet one day extend in larval developmental period. For pupation period of larvae moved towards wooden dust. The pupation period and adult moth emerged depending upon the quality of foods source. The findings of present study the length shown in (fig. G) duration of pupation 5 – 7 days on potato diet but in synthetic diet their pupation period was long for a day. After emerged male length (fig. J) duration 2–3 days and female length (Fig. I) duration 4 – 5 days respectively.

**Plate 1: Morphometric Study on Developmental stages of *Leucinodes orbonalis* Guenee**



**Table 1. Morphometric analysis on developmental stages of *Leucinodes orbonalis* gueneeon potato tuber**

Sr. no.	Insect Stage	Length (mm)	Duration (Days)	Mean $\pm$ SE
1	Egg	0.55 - 0.64	3 - 6	0.59 $\pm$ 0.045
2	First instar	1.21 - 2.30	1 - 2	1.75 $\pm$ 0.545
3	Second instar	4.50 - 7.10	2 - 3	5.80 $\pm$ 1.30
4	Third instar	8.0 - 10.11	2 - 4	9.05 $\pm$ 1.05
5	Fourth instar	10.00 - 14.50	2 - 5	12.25 $\pm$ 2.25
6	Fifth instar	12 .50- 18.10	3 - 6	15.3 $\pm$ 2.80
7	Pupa	9.10 - 11.20	5 - 7	10.15 $\pm$ 1.05
8	Adult Male	7.50 - 8.80	2 - 3	8.15 $\pm$ 0.65
9	Adult Female	8.70 - 9.60	4 - 5	9.15 $\pm$ 0.45

**Table 2. Morphometric analysis on developmental stages of *Leucinodes orbonalis* gueneeon formulated synthetic diet**

Sr. no.	Insect Stage	Length (mm)	Duration (Days)	Mean $\pm$ SE
1	Egg	0.55 – 0.64	4 – 8	0.59 $\pm$ 0.045
2	First instar	1.21 – 2.30	2 – 3	1.75 $\pm$ 0.545
3	Second instar	4.50 – 7.10	2 – 4	5.80 $\pm$ 1.30
4	Third instar	8.0 – 10.11	3 – 5	9.05 $\pm$ 1.05
5	Fourth instar	10.00 – 14.50	3 – 6	12.25 $\pm$ 2.25
6	Fifth instar	12.50– 18.10	4 – 7	15.3 $\pm$ 2.80
7	Pupa	9.10 – 11.20	5 – 8	10.15 $\pm$ 1.05
8	Adult Male	7.50 – 8.80	2 – 4	8.15 $\pm$ 0.65
9	Adult Female	8.70 – 9.60	4 – 6	9.15 $\pm$ 0.45

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