

Study of Biology of *Leucinodes orbonalis* Guenee (EFSB) Under Laboratory Condition Fed on Two Different Diets

V.S.NETAM¹, V.S.SHEWALE²

Research Scholar¹, Assistant Professor²

Department of Zoology^{1,2}

Sadguru Gadage Maharaj College, Karad (M.S.)^{1,2}

Abstract: *Leucinodes orbonalis* Guenee also called Eggplant Fruit and Shoot Borer (EFSB) is the most devastating pest all over the world. It feeds on different *Solanum* species having a wide diversity of flowering plants like potato, tomato, and brinjal. In the present study, the biology of *Leucinodes orbonalis* Guenee was studied under laboratory conditions throughout the year. The larvae were collected from the fields of nearby plantation plots and the culture was maintained at 27° C with 85% RH in the laboratory of the department of zoology S.G.M.College Karad. After completing their life cycle in the laboratory the next cycle was continued using two different diets. The biology was studied using two different diets viz, Brinjal (*Solanum melongena* L) and Potato (*Solanum tuberosum*). The development period of *Leucinodes orbonalis* Guenee in the brinjal and potato diet was observed daily. The incubation period of eggs of *Leucinodes orbonalis* Guenee fed on brinjal fruits was 3.5 days and in the case of potato fed it was 3 days. The larval & pupal period in the brinjal was 11 & 9.5 days and in the potato diet, it was 10 & 8.5 days respectively. Adult longevity is longer in the potato diet as compared to the brinjal diet. The life cycle completes in 23 days in brinjal-fed larvae and 21 days in potato-fed larvae. Fecundity is found to be more in potato-fed *Leucinodes orbonalis* as compared to brinjal-fed larvae. As the adult longevity is more in potato fed in of *Leucinodes orbonalis* the fecundity is higher than in brinjal fed.

Keywords- *Leucinodes orbonalis* Guenee (EFSB), brinjal (*Solanum melongena* L), Potato (*Solanum tuberosum*), adult, larva.

1. INTRODUCTION

Brinjal is consider more popular vegetable all over the world, it is cultivated commonly throughout the year. India hold second rank next to china in the world for the production of brinjal, it is commercial as well as economically important crop which is infested by more than 36 pest (Regupathy *et al.*, 1997). *Leucinodes orbonalis* Guenee, brinjal shoot and fruit borer is most devastating pest of brinjal and other related vegetable. In India the first occurrence of *Leucinodes orbonalis* Guenee was reported by (Dhankar, 1988). As they feed inside the shoots and fruits it is difficult to control (Ghosh & Senapati, 2009). It start feeding at the early stage of fruit, plant leaves and shoot, while feeding on the fruit it bore inside the fruit and seal the entry point with fed part of fruits so they may leave inside the fruit easily for their survival, due to which the marketable value of the fruit decreases.

To get rid of this pest farmers used chemical pesticides, but the chemical pesticides not only kill the insect but also may harm the vegetable which directly affect the productivity. To study its infestation rate and to keep that in control and which stage of this pest is harmful, so it is necessary to study the biology of the *Leucinodes orbonalis* Guenee, for this we required a mass rearing or culture to study. Therefore it is important to study the biology of *Leucinodes orbonalis* Guenee on different diets at laboratory condition.

2. MATERIALS AND METHODS

To study the biology of the *Leucinodes orbonalis* Guenee rearing of mass culture in necessary. The rearing were done throughout the year in the laboratory, Department of Zoology, S.G.M.College Karad. Infested and unsprayed brinjal fruits were collected from the nearby fields of Karad tehsil and brought in the laboratory. The brinjal fruits were cut manually and removed the larvae sensitively and placed them in the plastic jars with fresh diet under laboratory condition of 27 - 28° C and 85- 86% RH. After completion of larval and pupal stage the adult male and female emerge out and newly and

health adult were separated and placed them in the other plastic jar. After successfully rearing of two life cycle the 3rd cycle was taken for study its biology on two different diet under laboratory condition. After hatching of 1st instar from the eggs the instars were collected manually by camel painting brush and separated them as 10 larvae were placed in one jar with brinjal fed and 10 larvae were placed with potato fed both the jars were covered with muslin cloths and tighten with rubber bands, daily care were taken as brinjal feed were replaced daily due to its rotting & shrinking property, but the potato feed were replaced as gap of 2 days. The larval period was daily counted and observed molting of both the fed.

After completion of larval duration they formed a cocoon which is a pre pupal stage before going to the pupation they stopped feeding and start secreting the thread which helps them to covers its whole body, this cocoon will help them for the easy pupation and away from various problems. They mostly pupated on the muslin cloths at the edge of opening of each jars, The pupae were collected sensitively form both the jars and placed in the new jars with 5% sugar solution, small balls of cotton were made and were dipped in the 5% sugar solution and placed them on the walls of the jars. The pupal period of the both the fed was recorded daily. After completion of the pupal period the adult moths were emerge out.

Adult (male & female) pairs from both the jars were placed in new jars for mating. The jar were kept with cotton soaked 5% sugar solution and fed as per jars, so that the adult will lay eggs on it. On same night the mating occur and in early morning the eggs were laid by the female in both the jars on walls of the jars, some on muslin cloth, and on fed no eggs were laid in the day time. The eggs laid by the female moth were daily counted from the 1st oviposition till death of the adult female moth. The longevity of the adult male and female were recorded. The eggs were observed daily and recorded its period until they hatched out. The total life cycle of the *Leucinodes orbonalis* Guenee was recorded from egg to adult (male and female). After hatched out 1st instar larva the life cycle of the *Leucinodes orbonalis* Guenee is continued further.

3. RESULT AND DISCUSSION

The study of different biological parameters of *Leucinodes orbonalis* Guenee on two different fed was carried out in laboratory condition in department of Zoology at S.G.M.College Karad maintained with 27° C and 85% RH. The culture of both the fed were observed daily. The coherence of fecundity, egg hatched period, larval duration, pupal period and adult longevity was studied, remarkable difference was recorded. After mating occurred in both the jars of brinjal and potato fed, the egg laid by the female moth reared in Potato *Solanum tuberosum* fed was comparatively high with 123.3 eggs in numbers while in brinjal *Solanum melongena* L fed it was 100 eggs respectively, eggs were laid by female was found singly and in bunch, on the muslin cloth, walls of the jars and on both the fed, they are creamish white in color, elliptical in shape, fecundity rate was higher in the month of August with 27.45° C, 18.90°C and 90% i.e. 240.3 eggs and lower in the month of November were 21.95°C, 11.90°C and 86.75%, i.e. 88 eggs per female, (Singh *et al.*,2003). The hatching period of eggs was 3.6 days of brinjal fed, but there was quite difference in potato fed i.e. 3 days. Eggs changed with dark orange color to black spot at the tip of the egg when it is about to hatch. The eggs were hatched mostly in early morning at 7.00 – 9.0 AM, a single female moth laid 170 eggs (Kavitha *et al.*, 2008). After the incubation period of eggs over larvae hatched out, freshly hatched larvae were in search of food. Larvae after emergence were moult in 5 instar stages and completes its larval development, they appeared creamish white to pink in color. The larval developmental period in potato fed was 8 – 10 days, while in brinjal fed it was 9 – 10 days, there is a mean difference of 0.6 days between both the fed. When the larvae gone to the 4th instar they fed voraciously, while the 5th instar stage there color remains same but the size varies from 4th instar and they stopped its feeding and starts pupation,

the larvae passed into 5 instars stages in its larval development period as per reported by (Singh and Singh. 2001 and Atwal and Dhaliwal, 1997). Fully matured larvae were entered for pupation inside the jars, they pupate on the muslin cloth or inside the fruits. Pupae were pink in color at first day, but later they become dark brown, both the end of the pupa were tapers with wing margins which ends on abdominal segments of it. The pupal period in potato fed was 5 – 9 with mean period of 6.6 which tooks shorter period as compared to brinjal which required 8- 9 days with 8.3 mean period, respectively, pupal period was 9.6 days recorded by (Van Hung *et al.*, 2020). After the total incubation period of pupa the newly adult emerged out, the adult is creamish or dusky white in color the wings having white color with brown trinagular spots on it, the wings consist of hairy margins. The abdomen of male was blunt while female have pointed abdomen which are curved in shape inverted to its body, female is larger than male. The mean longevity of the male & female in potato fed was 3.6 & 6.6 days which was highest than the brinjal fed i.e. 2.3 & 4.6 days, respectively. Comparitvely to the brinjal fed there was major difference in the longevity of adult male and female in potato fed, longevity of male is short with respect to female longevity which varies between 2-3 days with an average of 2.4 ± 0.52 days and after mating the death of the adult male occurred (Van Hung *et al.*, 2020). The pre-oviposition period of 1.35 days was observed by (Kavitha *et al.*, 2008), the mean pre-oviposition period was recorded 1.6 days in potato fed and more than that 2.3 days in brinjal fed, respectively.

4. CONCLUSION

The comparatively instead of brinjal fed, potota fed had shown more favourable results which is best for rearing of *Leucinodes orbonalis* Guenee. The potato fed completes life cycle within 19.6 days, and cheap as compared to brinjal, likewise brinjal it didn't shrink and rot easily. It is also better than the artificail diet which are expensive and time consuming for the study of growth parameters to meet early stage of larvae.

Table 1. Different parameters biology of *Leucinodes orbonalis* Guenee with Potato (*Solanum tuberosum*) Brinjal (*Solanum melongena* L) fed.

Sr.no	Parameters observed	Potato (<i>Solanum tuberosum</i>) fed		Brinjal (<i>Solanum melongena</i> L) fed	
		Period (Days)	Mean	Period (Days)	Mean
1	Pre-oviposition period (days)	1 – 2	1.6	2- 4	2.3
2	Fecundity (eggs)	100 - 150	123.3	70 – 120	0
3	Oviposition period (days)	2-4	3	3 – 4	3.6
4	Larval period (days)	8 - 10	9	9- 10	9.6
5	Pupal period (days)	5 - 9	6.6	8 – 9	8.3
6	Life cycle (egg to adult in days)	15 - 23	19.6	20 – 23	21.6
7	Longevity of adult moths				
A	Male	2 – 5	3.6	2 – 3	2.3
B	Female	5 – 8	6.6	4 – 6	4.6

References

1. Atwal, A.S. and Dhaliwal, G.S.1997. Pests of summer vegetables. In: *Agricultural Pests of South Asia and their Management*. Kalyani Publishers, New Delhi. pp. 264-269.
2. Ghosh, S.K. and Senapati, S.K. 2009. Seasonal fluctuation in the population of *Leucinodes orbonalis* Guenee in the sub-himalayan region of West Bengal, India and its control on eggplant (*Solanum melongena*). *Prec. Agril.* **10**(5): 443-449.
3. Kavitha, V.S., Revathi, N. and Kingsley, S. 2008. Biology of brinjal pest, *Leucinodes orbonalis* Guenee of Erode region in Tamil Nadu. *J. Entomol. Res.* **32**(3): 255-257.
4. Regupathy, A., Armes, N.J., Asoken, G., Jadhav, D.R., Soundarajan, R.D. and Russell, D.A. 1997. Best method for insecticide resistance management of *Helicoverpa armigera*. In: *International Conference on Integrated Approach to Combating Resistance*. A.L. Devonshine (ed.), April 14-16, 1997. IACR, Rothamsted, Harpendle, UK. 116.
5. Singh, B., Pandey, R., Singh, A. and Dwivedi, S., 2021. Efficacy of certain insecticides against brinjal shoot and fruit borer *Leucinodes orbonalis* Guenee. *Indian Journal of Entomology*, **83** (3): 464-467.
6. Singh, Y.P. and Singh, P.P. 2001a. Biology of shoot and fruit borer (*Leucinodes orbonalis* Guenee) of eggplant (*Solanum melongena* L) at medium high altitude hills of Meghalaya. *Indian J. Entomol.* **63**(3): 360-368.
7. Van Hung, V., Hung, D. V., & Anh, D. T. L. (2020). Study of Biological Characteristics of *Leucinodes orbonalis* Guenée which Destroyed Young Shoot and Fruit of Eggplant (*Solanum melongena* L.): A case in Trang Bom district, Dong Nai province, Vietnam. In *IOP Conference Series: Materials Science and Engineering*. **941** (1), p. 012036. IOP Publishing.