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Seasonal Occurrence and Abundance of *Leucinodes orbonalis* Guenée, 1854 in Eggplant

Dr. Kamalesh Kumar
Department of Zoology, M.L.K PG College, Balrampur, Uttar Pradesh, India
E-mail: *shakyakamlesh584@gmail.com*

Abstract

The goal of the current experiment was to determine the frequency and severity of *Leucinodes orbonalis* infection on eggplant throughout specific seasons. On the randomly chosen plant, information was gathered by counting the number of sick and healthy shoots. The adult population of the brinjal shoot and fruit borer *Leucinodes orbonalis* Guenée varied greatly not only from year to year but also in various months, according to the findings of two consecutive years. The number of adults significantly climbed in the months of October and November before falling off in the second week of December. During both years, there was a positive association between the highest temperature and the number of moths (r=.302). The minimum temperature showed a positive connection with moth trapping (r=.392), suggesting that the minimum temperature is crucial for the development of moth populations.

Keywords: Seasonal occurrence and abundance *Leucinodes orbonalis, Solanum melongena*.

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Introduction

The high nutritional value of *Solanum melongena*, which includes vitamins A, B, and C and is also abundant in minerals like iron, phosphorus, and calcium, gives it a significant place in the average diet. According to Ayurvedic medicine, white brinjal is beneficial for diabetes people. The area used for brinjal farming in India is thought to be 0.51 million acres. having productivity of 16.08 t/ha and overall production of 8,200,000 metric tonnes. Although the skin and the entire fruit are edible, there are several destructive insect species that injure *Solanum melongena* and lower its economic worth. One of these is the fruit and shoot borer *Leucinodes orbonalis.*

This stem and fruit borer injures around 20.7% of fruits on average, and even if the damaged section of the fruit is thrown away, the weight loss is roughly 9.7%. There have been attempts to employ various pesticides to manage this infamous bug (Jotwani and Sarup, 1963 ; Joshi

and Sharma,1973; Mehta and Lall, 1988;1989 a and b). The population of the brinjal shoot and fruit borer has been managed by these researchers using cypermethrin, carbylthiometon, aldicarb, and other additional *Leucinodes orbonalis* fourth-generation insecticides.

Adverse effects on beneficial insects, wildlife, and ultimately the human population through the food chain system were caused by the indiscriminate and persistent use of hazardous chemicals on agricultural commodities. These effects included a resurgence of pests, an outbreak of secondary pests, insecticide-resistant insects, and pests that were resistant to pesticides.

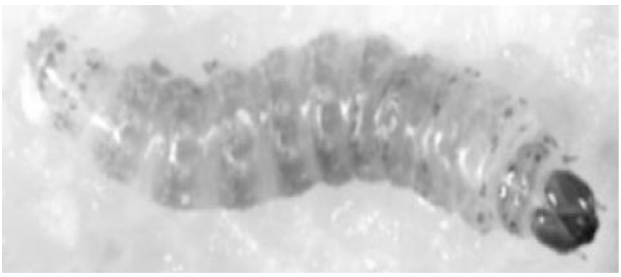
The quantity of the extent of the injury and consequent loss is a prerequisite for the development of management schedules for any pest, taking the aforementioned factors into consideration as well as the economic significance of the pest that must be gained in terms of the level of the pest population. In order to organise the current study, *Leucinodes orbonalis* Guenee (Lepidoptera: Pyralidae), a dangerous and polyphagous pest with a clear predilection for brinjal, was used.

Materials and Methods

The field experiments were carried out during *kharif* 2021- 2022 at the Agriculture Research farm Bichpuri, which is located 14 km. for from Agra, by following common agronomic practices prescribed in (package of practices for high yielding verities).The occurrence of brinjal shoot and fruit borer, *Leucinodes orbonalis* Guence was recorded starting first after twenty days of transplanting the crop at seven days intervals (Singh et al. 1997).

The observations on the population of *Leucinodes orbonalis* Guenee was recorded in terms of damage to leaves shoots and fruits were recorded by counting the total number of shoot and fruits with the damage on ten plants selected randomly in each replication. Weekly data on weather parameters were recorded and subjected to a simple correlation study.

Results and Discussion



Mid instar larvalate instar larva

Tables 1 and 2 demonstrate that the pest's larval infestation began in the first week of August in both of the years under investigation. From the third week of September to the third week of October, the number of larvae was nearly constant, but beginning in the second week of November, the population of larvae began to decline. The larval population reached its peak in both years between the third week of September and the third week of October. The third week of November in both research years marked the beginning of a decline in the larval population. Records from the years 2021 and 2022 reveal that the larval population was found in the experimental field in decreasing order after the second week of November in both years.

Table: 1 Shoot and fruit damage by *Leucinodes orbonalis in* Guenee in Relation to Environmental Factors on Brinjal

Date of observation	Shoot damage %		Fruit damage %	
	Infestation%	Intensity /plant	By number	by weight
18- August	0.0			
25-August-	16.44	0.15		
1September	73.03	1.05		
8September	50.48	1.34		
15September	53.35	1.46		
22-September	60.43	2.45		
29-September	86.49	2.86		
6-October	80.35	2.76		
13-October	50.05	1.67	16.76	13.87
20-October	53.32	1.45	33.23	33.54
27-October	40.21	1.21	66.43	66.34
3-November	16.43	0.43	33.12	33.23
10-November	26.41	0.56	16.54	13.87
17-November	0.0	0.34	7.89	5.86
24-November			9.87	9.64
1-December			6.54	3.87
8-December			5.65	2.45
15-December			5.75	3.45
22-December			12.75	8.34
29-December			7.62	3.79
5-January			0.0	0.0

Table: 2 Seasonal occurrence *Leucinodes orbonalis* Guenee (Larvae/ adults) in the years 2021 and 2022

Month and year 2021-2022	Year 2021and 2022			
	Number of adults trapped per week		Number of larvae trapped per week	
	Mean	SD	Mean	SD
August	3.25	2.06	4.5	2.38
September	21.8	9.12	12.8	3.11
November	2.5	1.29	18.0	6.73
December	0.4	0.55	4.2	1.48
January	5.75	5.85	1.75	1.26
February	18.5	2.52	6.75	2.50
March	13.2	3.49	20.00	5.03
April	9.5	4.04	18.75	5.50
May	1.5	1.29	2.0	0.82
June	1.2	0.84	0.8	0.45
July	3.25	1.26	2.0	0.82
August	2.4	1.14	1.6	0.55
September	21.25	7.14	11.75	2.75
October	8.0	3.27	24.5	5.51
November	2.2	1.48	17.2	6.06
December	1.25	0.96	5.5	3.42
January	2.5	1.29	1.75	0.50
February	11.25	4.03	2.75	1.71

Table: 3 Correlation (r) with Environmental factors

Parameters	Shoot infestation	Intensity/ plant	Fruit Infestation % by number	Weight	Moth Trapping
Temperature					
Maximum	0.216	0.172	0.699	0.721	0.302
Minimum	0.808	0.633	0.681	0.706	0.392*
Relative humidity					-0.356
Maximum	0.515	0.349	-0.211	-0.238	
Minimum	0.386	0.241	-0.438	-0.693	
Rainfall (mm)	-0.476	-0.546	-0676	-0.201	-0.476*

***Significant at 5% level.**

Therefore, the third and last week of October had the greatest average population, while the third week of December to the first week of January 2021 saw the lowest average population. The adult population was not monitored from the second week of December 2021 to the first week of January 2022. In none of the four fields did the larval population considerably change. The data do not show a statistically significant difference in larval population in any of the four fields, as can be seen from Tables 1& 2 but statistical data do have a substantial influence on the larval population.

The statistical analysis for the year 2021 and 2022 also reveals that interaction has no significant effect on the larval population of *Leucinodes orbonalis* Guenee. However, the larval population varied significantly at different times. During the year 2021-22 it is evident from Table-1 and 2 that the larval population was found in descending order in month of November 2021 to the first week of January 2022. The maximum population was recorded in third and fourth week of October 2021. Further the population analysis revealed that during both the years in different field's larval population varied significantly.

However, the occurrence of larvae was not due to the type of host plant but the maximum or minimum population of larvae and adults was due to the prevailing ecological conditions. Statistically, the highly significant values were obtained in both the years of investigation.

The interaction effect of host species and periods had not the pronounced effect on larval population as the non-significant values were obtained during both the years of investigation. Nevertheless, the host species and periods did not affect the larval population independently. Over and above, it is amply documented from the analysis that the main effect in building up of larval population is mainly due to the period associated with biotic and abiotic factors.

From the findings it can be concluded that larval as well as adult population of *Leucinodes orbonalis* Guenee has reciprocal relationship with the ecological factors. The maximum number of larvae observed in third and fourth weeks of October and in first week of November in both years during present investigation.

It is obvious from the data of the Table-3, that the simple correlation between rainfall and moth capturing during 2021-22 also, rainfall resulted in a negative correlation (r= -0.476) during both years of study their association was non-significant so it clearly indicates the population of *Leucinodes orbonalis* Guenee decreased in rainy seasons.

Regarding the relationship between temperature and the presence of pests, it is amply demonstrated by the data in Table 3, that the maximum temperature and the presence of moths had a positive correlation (r= 0.302) during both years, though it was not statistically significant, meaning that as the temperature drops, so does the moth population. Even if they have a clear correlation, their non-significant values over the course of the two years show this. However, the number of moths is not much impacted by the maximum temperature.

The correlation coefficient of minimum temperature and moth trapping came out with a positive (r = 0.392) correlation during the period of study. Thus, it clearly indicates that the minimum temperature plays an important role in building up of moth population. During both years of study, the negative correlation and non-significant values of relative humidity with adult trapping show that there is no impact of relative humidity on population fluctuation of moths and it also discourages the moth prevalence.

This result is in conformity with those of Shukla (2010) who recorded that *Leucinodes orbonalis* Guenee increased considerably in the month of October and November and decreased subsequently in the week of December. The maximum temperature and abundance of moths showed a positive correlation (r=0.319).

The present investigation is also supported by Atwal and Verma (1972), Lal (1975), Mehto et al., (1980), Pawar et al., (1986), Sukla (1989), Dhamdhere et al., (1995), Bharadiya and Patel (2005) and Chandra Kumar et al., (2008).

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