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Research Article

STUDIES ON FEEDING BEHAVIOUR OF SUGARCANE TOP BORER, *TRYPORYZA (SCIRPOPHAGA) NIVELLA* (FAB.), (LEPIDOPTERA: PYRALIDAE) ON SUGARCANE - *SACCHARUM OFFICINARUM* (LINN.)

***Praveen Kumar and K.S. Rana**
Environment Research Laboratory, Department of Zoology,
Agra College, Agra -282002
**Author for Correspondence*

ABSTRACT
Sugarcane (*Saccharum officinarum* L.) is the main source of sugar in India and holds a prominent position as a cash crop. Uttar Pradesh itself contributes about 55.6 % of the total sugarcane crop in India. The yield of sugarcane in India is very low as compared to many other countries i.e. Brazil, etc.. Various factors viz, extreme hot summer, excessive rainfall in rainy season, cold and frosty winter season, diseases, viruses etc. are responsible for the low yield of sugarcane. In spite of these factors, in different parts of India, this crop is also attacked by a number of insect pests i.e. borers, leaf eating, and sucking type. Sugarcane borers are one of the most important above ground pest of sugarcane in country. Among them, *Tryporyza (Scirpophaga) nivella* (Fab.) is a serious and most destructive pest of this valuable cash crop. During heavy infestation, the larvae (caterpillar) feed the newly growing leaves resulting a high percent of reduction in the sucrose quantity in the plant. Therefore, it is necessary to study the feeding behavior of *Tryporyza (Scirpophaga) nivella* (Fab.) on the host plant sugarcane because the feeding behavior of this pest increases or decreases the yield production of sugarcane cash crop. So, in the present investigations, the author has tried to study the feeding behavior of *Tryporyza (Scirpophaga) nivella* (Fab.) during pre-oviposition, oviposition, post-oviposition and different larval instars on sugarcane in the laboratory.

Key Words: *Feeding behavior, Tryporyza (Scirpophaga) Nivella (Fab.), Sugarcane Top Borer, Saccharum Officinarum L.*

INTRODUCTION
Tryporyza (Scirpophaga) nivella (Fab.) is a member of family Pyralidae of one of the largest order Lepidoptera (moths and butterflies), of class Insecta or Hexapoda. The life history of this pest showed complete metamorphosis with four developmental stages viz, egg, larva, pupa and adult (Kumar and Rana, 2012). The damage was caused by larvae (caterpillar) which had chewing and cutting type mouth parts (Kumar and Rana, 2011). From the last May to July first, the newly hatched larvae (caterpillar) started feeding into the midrib from the underside of the sugarcane leaves and began their journey within the midrib towards the base of leaf, cause a loss of stalk weight (tonnage/acre) and sucrose yield as analyzed by Manager Singh *et al.* (2004). Feeding nature of top borer had evolved in connection with the utilization of different kind of food but in every case the behavior has been conceived as a complex interacting sequence of responses to a variety of stimuli culminating in ingestion to repletion. The nature of the component may vary from species to species as reported by Singh *et al.*, (1984).
The discrimination of quality which set the pattern of feeding and determined the success or failure of ingestion was accomplished by the whole procedure. In this case adult moth tabbed sugarcane plant leaves with its antennae. The mouth parts helped in this phenomenon. Odour and other physical indications also motivated moth in it as reported by Chen and Romena (2006).

MATERIALS AND METHODS
The experiment was conducted in Environment Research Laboratory in the Department of Zoology, Agra College, Agra as well as in Deen Dayal Deemed University at district Mathura during the experimental

year 2010-2011. Fresh eggs were collected from the selected sugarcane field in village Nagla Kalua, (Block-Nidhauli) of District Etah (U.P.). In this study, some healthy and fresh leaves are also collected from the same selected field and were kept in Petridis at room temperature in support of Halbe, P.S. and Begal, T.S. (1950). The eggs hatched in laboratory and the observations of feeding behavior of larval instars viz, 1^{st} , 2^{nd}, 3^{rd}, 4^{th} and 5^{th} have been recorded on the periods of pre-oviposition, oviposition and post-oviposition in support of Hugar *et al.*, (2010). The data obtained were analyzed statistically and presented in tables 1, 2 and 3 and also in graphes I, II and III.

RESULTS AND DISCUSSION

It was evident from the observations that laying eggs over leaves of plants by female, after hatching did not have to locate plant sources themselves as reported by Chen Hao *et al.* (2008). Larvae were able to locate their host plant from a very short distance by smell (Bergger, 1992). It was recorded that the starting of pre-oviposition had very feeding i.e. only about 30 percentage of day was used in feeding (table-1). Feeding activity recorded up to 62 percent as days were spent as shown in table-1.

During oviposition period female stopped feeding whereas male started feeding vigorously. When the clusters of eggs were completed, than the female fed vigorously. This work is well supported with Singh, *et al.* (1984). Morning and evening hours were peak feeding hours.

During post-oviposition period, the feeding of female moths, after laying several batches of eggs, ultimately died. Moth spent 20 percent time on 2^{nd} day (table-2). Moth fed on same rate on 3^{rd} day and 4^{th} day. Afterwards the time spent in feeding gradually decreased. On 10^{th} day there was no trace of feeding activity. The moth became inactive and died (table-2).

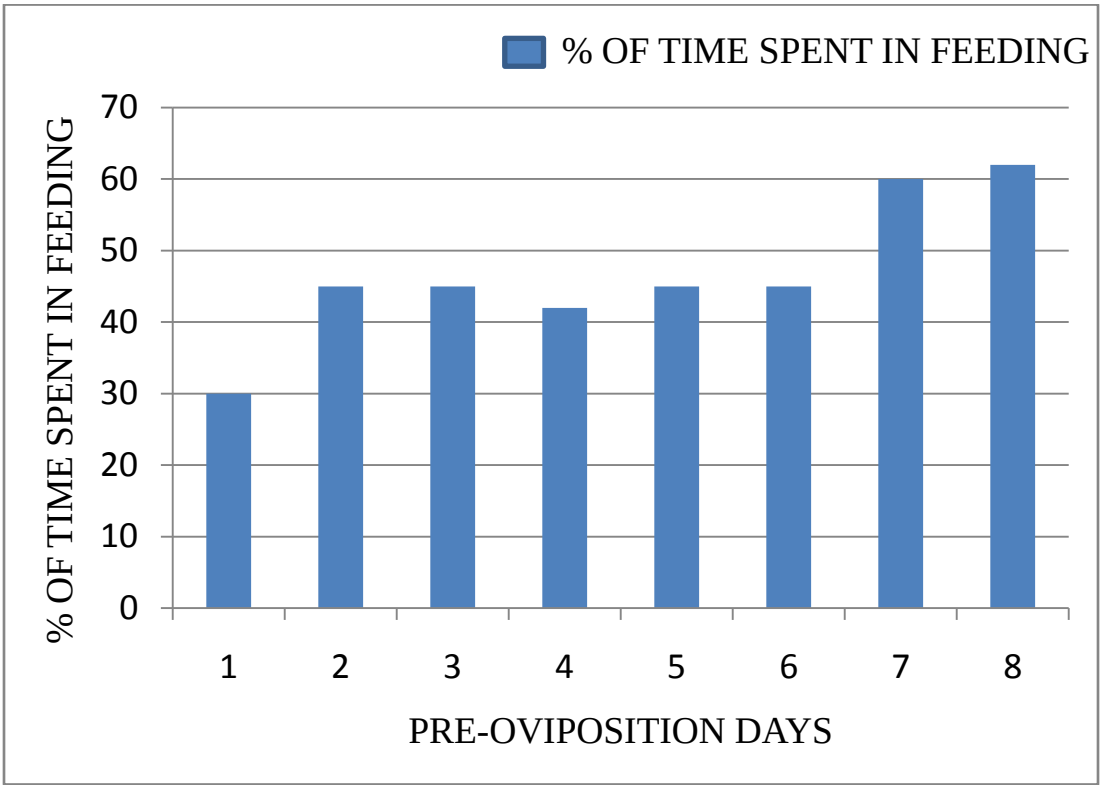
In different larval stages, larva fed maximum and vigorously at 4^{th} day after second moult feeding activities recorded about 46 percent time of the day and larva became sluggish as the time of next moult came i.e. feeding was slowed by larvae. This work is well supported with Dirie, A .M. *et al.* (2000). There were five larval instars viz, 1^{st}, 2^{nd}, 3^{rd}, 4^{th} and 5^{th} which had taken time 2.24, 4.83, 5.56,5.94, and 6.67 respectively (table-3). This work is well supported with Kamani and Vyas (1985). Feeding behavior was decreased after complete second moult as shown in table-3.

It was also discussed that before pupation, the larvae fed and cut an exit hole and constructed a silken gallery for pupation near the exit hole. The pupa emerged out from the exit hole.

After 10 to 12 days pupa got converted into adult. The adult showed very slow feeding but this gradually increased. As oviposition commenced, the feeding attained its peak values as reported by Pandya *et al.* (2007).

Table 1: Percentage of time spent in feeding during pre-oviposition days

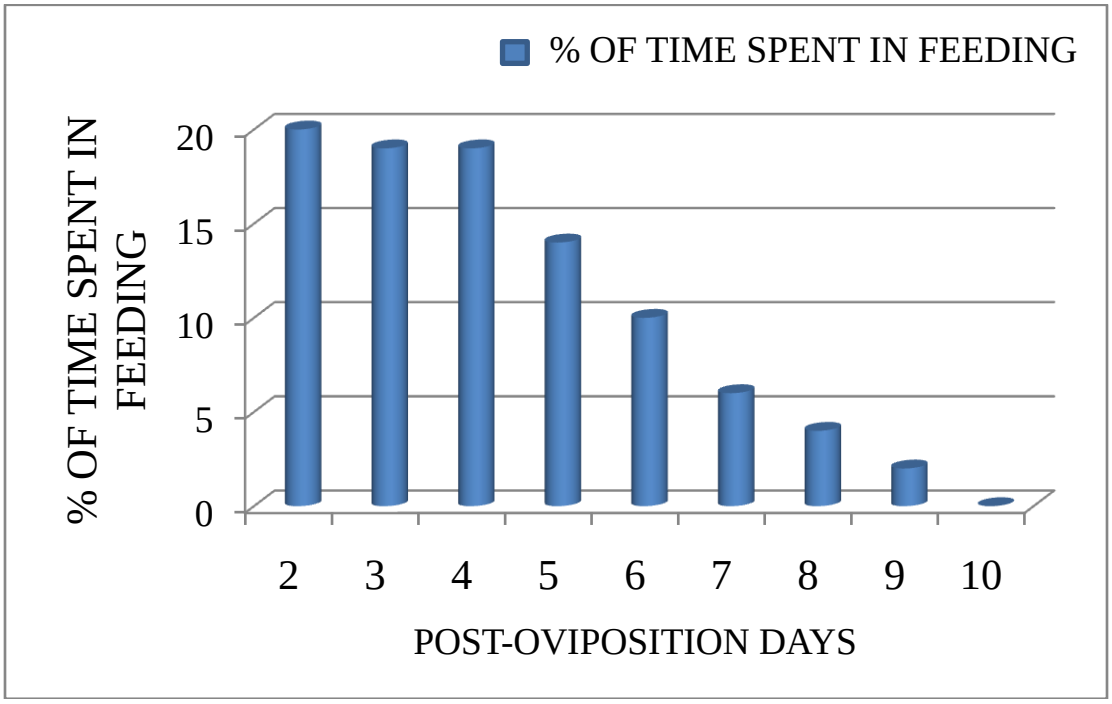
Sl. No.	PRE- OVIPOSITION DAYS	% OF TIME SPENT IN FEEDING
1.	1	30
2.	2	45
3.	3	45
4.	4	42
5.	5	45
6.	6	45
7.	7	60
8.	8	62



Graph I: Showing relation between pre-oviposition days and percentage of time spent in feeding

Table 2: Percentage of time spent in feeding during post-oviposition days

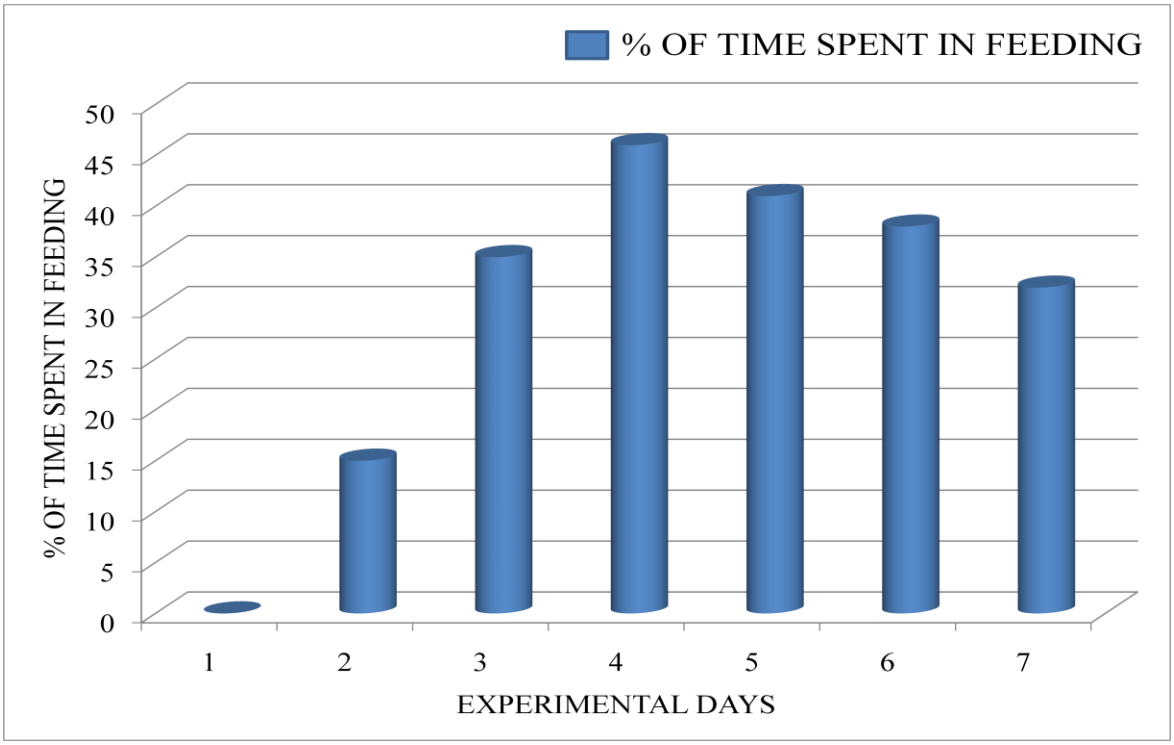
Sl. No.	POST-VIPOSITION DAYS	% OF TIME SPENT IN FEEDING
1.	2	20
2.	3	19
3.	4	19
4.	5	14
5.	6	10
6.	7	06
7.	8	04
8.	9	02
9.	10	00



Graph II: Showing relation between post-oviposition days and percentage of time spent in feeding

Table 3: Percentage of time spent in feeding by five successive instars during experimental days.

Sl. No.	Experimental Days	Moultings (with days)	Percentage of Time spent in feeding by larva
1.	1	-----	----
2.	2	First Moulting (2.24)	15
3.	3	----	35
4.	4	Second Moulting (4.83)	46
5.	5	Third Moulting (5.56)	41
6.	6	Fourth Moulting (5.94)	38
7.	7	Fifth Moulting (6.67)	32



Graph III: Showing relation in five successive larval instars and percentage of time spent in feeding

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