

Bionomics of Sugarcane Top Borer, *Tryporyza nivella* Fabricius (Lepidoptera: Pyralidae) Under Junagadh Condition

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ABSTRACT

Bionomics of sugarcane top borer, *Tryporyza nivella* (F.) have been studied in detail under laboratory conditions at Junagadh during 1981-82. Average incubation period was recorded as 7.97 days, while the first, second, third, fourth and fifth instar larval duration were completed in 2.13, 4.63, 5.23, 5.85 and 6.42 days, respectively. Pre-pupal and pupal periods lasted for 1.45 and 11.80 days, respectively. Longevity of male and female moths was on an average 3.63 and 3.44 days, respectively. Mean number of egg masses laid/female was 4.22, whereas, the average fecundity of female was 94.15 eggs. The sex-ratio (male; female) was worked out to be 1 : 1.109 under laboratory condition.

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INTRODUCTION

Sugarcane (*Saccharum officinarum* L.) is one of the important cash crops grown in India. In Gujarat state, it is grown in about 7.49 lakh hectares with an annual production of 44.35 lakh tonnes canes, during the year 1980-81 (Anonymous, 1981). In India, sugarcane is attacked by more than one hundred species of insect pests. Of these the top borer, *Tryporyza nivella* (F.) is considered to be an important pest of sugarcane. Biology of this pest was attempted by Huque and Agarwala (1955) in Bihar, Kalra and Sidhu (1965) in Punjab and Patel (1963) and Patel (1975) under south Gujarat condition. Information on biology of this pest was not available particularly from the Saurashtra region of the Gujarat state and hence attempts were made to study the same and information is presented hereafter.

MATERIALS AND METHODS

With a view to initiate the laboratory culture of sugarcane top borer, full grown larvae and pupae were collected from infested cane fields at Sugarcane Research Station, Junagadh and kept in a plastic jar (11 cm in diameter and 18 cm in height) for further rearing. The adults emerging from them were paired in glass jars measuring 15 cm x 20 cm for studying the fecundity, longevity and oviposition periods. Pieces of sugarcane leaves wrapped with wet cotton wool were provided to facilitate oviposition. Cotton swab soaked in five per cent honey and proteinex solution was provided as food to the adults. Newly hatched larvae were released on healthy shoots kept in the rearing jars and allowed to feed on midribs upto the first instar duration. The second instar larvae were put in an artificially prepared

cavity in split sugarcane fresh shoots (6 to 8 cm), the two halves of which were tied together with rubber bands and were kept in petridishes.

Various stages of this pest were measured with the help of stage and ocular micrometer.

TABLE 1

Pre-oviposition, oviposition and post-oviposition periods of *T. nivella* under laboratory conditions.

conditions.														
Period of study	Temperature °C			Average relative humidity (per cent)	No. of observations	Period (days)								
	Min.	Max	Av.			Pre-oviposition			Oviposition			Post-oviposition		
						Min	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.
Sep-20 to Sep. 27 1981	29.0	32.5	30.38	84.50	15	1.00	2.00	1.20	1.00	2.00	1.67	0.00	2.00	0.47
Nov. 2 to Nov. 10 1981	25.0	27.5	26.42	86.50	12	1.00	2.00	1.42	1.00	2.00	1.50	0.00	1.00	0.67
Overall	25.0	32.5	28.68	85.17	27	1.00	2.00	1.40	1.00	2.00	1.59	0.00	2.00	0.56

laid/female varied from 2 to 8 (average 4.22) and the number of eggs laid/female ranged from 18 to 131 eggs (average 94.15 eggs). The number of eggs laid/egg mass were also counted and varied

from 5 to 65 eggs (average 22.54 eggs).

2. Description and duration of various life stages (Table 2) :

Egg : Eggs are flattened, scale like, overlapping to each other in cluster and

TABLE 2

Measurements and duration of different stages of *T. nivella* at 21.5 to 32 °C laboratory temperature.

Stage of the insect	Measurements in mm		Duration in days	
	Length	Breadth	Average	Range
Egg	1.004	0.798	7.97	7-10
Larva:				
First instar	2.749	0.347	2.13	2-3
Second instar	7.501	1.011	4.63	3-6
Third instar	13.269	1.446	5.23	4-7
Fourth instar	20.412	2.185	5.85	4-8
Fifth instar	23.787	2.766	6.42	5-9
Pre-pupa	—	—	1.45	1-2
Pupa	13.837	2.559	11.80	9-15
Adult:				
Male	11.54	26.49	3.63	2-5
Female	13.39	32.67	3.44	3-5

— Not recorded.

* Wing expanded.

are covered with buff or orange coloured hairs from the anal tuft of female moth. It measured on an average of 1.004 mm in length and 0.798 mm in breadth. However, Butani (1966) reported the average length and breadth of *T. nivella* Fabr. eggs as 1.42 mm and 1.2 mm, respectively. The incubation period varied from 7 to 10 days (average 7.97 days). The hatchability of eggs ranged from 36.52 to 77.06 per cent (average 51.96 per cent) during September-November, 1981 when laboratory temperature was ranging from 21.5 to 32° C.

Larva : The larvae passed through five larval instars.

The newly hatched larva is reddish brown in colour with head and prothorax being dark chocolate colour and possessed long hairs on the body. It measured on an average of 2.749 mm in length and 0.347 mm in breadth. The average head width was recorded as 0.320 mm. The duration of first instar larva varied from 2 to 3 days with an average of 2.13 days.

The second instar larva is whitish in colour and thread like in structural appearance. The head capsule and the prothoracic segments are light brown to brownish in colour. It measured on an average of 7.501 mm in length and 1.011 mm in breadth. The duration of second instar larva ranged from 3 to 6 days (average 4.63 days).

In case of third instar larva, the colour is whitish creamy and the larval body is comparatively stout. The head capsule is yellowish brown in colour. It measured on an average 13.269 mm in length and 1.446 mm in breadth. The duration of third instar larva varied from 4 to 7 days (average 5.23 days).

The fourth instar larva is morphologically almost the same as third instar,

but dorsal vessel could be seen through the transparent integument as a thick line in between the fat globules. It measured on an average 20.412 mm in length and 2.185 mm in breadth. The duration of fourth instar larva ranged from 4 to 8 days (average 5.85 days).

The full grown larva is creamy yellow with yellowish brown head capsule. Dorsal vessel is also visible as in case of the fourth instar larva. Before entering into pupation, the colour of larva become yellowish. It measured on an average of 23.787 mm in length and 2.765 mm in breadth. The duration of fifth instar larva ranged from 5 to 9 days (average 6.42 days).

Published information regarding size and duration of individual larval instars is scanty, however, Bagal (1958), Gupta (1959), Butani (1966), Patel (1963) and Patel (1975) reported total larval duration only. The information pertaining to the length, breadth and duration of each larval instar of *T. nivella* has been recorded for the first time and seems to be a new contribution in this particular field.

Pre-pupa : Before pupation full grown larva stops feeding and become sluggish and the body colour turn to creamy yellow to yellow and reduced in its size. Before pupation the larva spin out a pupal chamber and prepare exit hole for the emergence of adult. A number of protective membranous silken discs are made before the larva pupated. The prepupal period varied from 1 to 2 days (average 1.45 days).

Pupa : Pupa of *T. nivella* is slender, transparent and pale yellow in colour. After 4 to 5 days, the posterior segments in the female are changed into buff or crimson coloured, due to formation

of the anal tuft. Eyes are big and black in males, but they are slightly smaller in females as compared to male pupa. It measured on an average of 13.837 mm in length and 2.559 mm in breadth. The duration of pupal stage ranged from 9 to 15 days (average 11.80 days).

Adult : The moth of *T. nivella* is silvery white in colour. The abdomen of the male is slender and pointed while that of female it is stout and covered with buff or orange hairy anal tuft. The male moth measured from 8 to 15 mm (average 11.54 mm) and from 18 to 36 mm (average 26.49 mm) in wing expanse. While in case of female, it measured from 10 to 18 mm (average 13.39 mm), whereas, its width (wing expanse) ranged from 24 to 37 (average 32.67 mm).

The longevity of male and female moths varied from 2 to 5 days (average 3.63 days) and 3 to 5 days (average 3.44 days), respectively.

Sex ratio : The sex ratio of *T. nivella* was worked out by sexing the adult from the general culture maintained in the laboratory. From 194 adults observed, 92 were found to be males while 102 of them were females. The ratio of male to female was thus worked out to be 1 : 1.109.

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