



RESEARCH ARTICLE

**Biology of Sugarcane Top Borer, *Tryporyza Nivella* (Fab.) (Lepidoptera: Pyralidae)
Under Climatic Conditions of Western Uttar Pradesh**

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ABSTRACT

T. nivella is one of the serious pest of sugarcane which greatly reduces the yield sugarcane. Studies were carried out in sugarcane fields in 2011-2012. The biology of *T. nivella*, showed that eggs were 0.2 to 1.5 mm in diameter, 1.2 ± 0.2 in length and 1.0 ± 0.2 mm in width. Incubation period was 8.73 days and the fecundity of female was 215.34 eggs per female. The newly emerged larva was white in colour with black head, 1 ± 0.3 mm in length with well developed head and mouth while the full grown larva was creamy white to light brown in colour and measured 28 ± 2.3 mm in length and 45 ± 1.8 mm in breadth. The newly emergence pupa was bright yellow which gradually changed to dark brown. The length of pupa was 3.2 ± 0.8 mm across the thorax region while the width of pupa was 16.3 ± 2.5 mm. The adult was silvery white in colour. Length of male and female was 2.24 ± 0.60 mm and 3.14 ± 0.85 mm respectively. Life span of male and female was 2.95 and 3.18 days. Total life cycle of the pest was 49.42 ± 2.02 days.

Keyword: Biology, Sugarcane Top Borer, *Tryporyza (Scirpophaga) nivella* (Fab.), *Saccharum officinarum* L.

INTRODUCTION

Top borer (*T. nivella*) is a major devastator pest of sugarcane which heavily destroys the sugarcane crop (Manager Singh *et. al.*, 2004 ; Abdul *et. al.*, 1986). *T. nivella* reduces the production of cane about 36-56 percent (Pandey *et. al.*, 1997). Selected pest is recognized as a member of Family- Pyralidae. The family- Pyralidae further belongs to Order- Lepidoptera of Class- Hexapoda (Halbe and Begal, 1950 ; Permana *et. al.*, 1985). The life history of this pest completes in four developmental stages viz; egg, larva, pupa and adult (YouChiashiens, 1943). Larvae bored into newly coming leaves through its midrib destroyed the newly growing leaves by vigorously feeding on it (Singh *et. al.*, 1984). The great damage was appeared from third week of May to first week of July (Deka and Sharma, 2005 ; Rana *et al.*, 1992). So, present research work was carried out under taken as a test case to know the biology of *T. nivella* during experimental year at natural conditions of selected sites.

MATERIALS AND METHODS

To study the biology of *T. nivella*, the research experiments were carried out on its host plants; sugarcane at four selected sites; village- Khayara of district- Mathura, village- Gopalpura of district- Aligarh, village- Nagla- Radhey of district- Hathras and village- Nagla Kalua of district- Etah of western U.P., during the experimental year; 01 April, 2011 to 31 March, 2012. For this study a sampling was conducted for collection of some adults of *T. nivella* from all selected sites in accordance of Malhi and Brar, (1998) and then collected insects were released in self prepared net houses at selected sites in support of Kamani and Vyas, (1985). Observations were recorded carefully with the help of hand lens, camera lucida, stereomicroscope etc from egg to adult stage as suggested by (Mukunthan, 1985). Some observations were performed in laboratory conditions. Insect collecting net, hand lens, plexiglass, containers, rearing cages and B.O.D. chamber were used to study the biology of selected pest as suggested by Pala Ram and Lakhi Ram (2003) ; Hugar *et. al.*, (2010).

RESULTS AND DISCUSSION

Eggs were more or less rounded or flattened, creamy white in colour, 0.2 to 1.5 mm in diameter, 1.2 ± 0.2 in length and 1.0 ± 0.2 mm in width. Incubation period of female was 8.73 days and the fecundity of female was 215.34 eggs per female (table no.-1). This experimental finding has the difference with the finding of Kamani and Vyas (1985) who recorded that incubation period was 7.97 days and the fecundity of female *T. nivella* was 94.15 eggs per female. The newly emerged larva was white in colour with black head, 1 ± 0.3 mm in length with well developed head and mouth while the full grown larva was creamy white to light brown in colour and measured 28 ± 2.3 mm in length and 45 ± 1.8 mm in breadth. First, second third, fourth and fifth larval instars had taken time 2.56, 5.01, 5.30, 6.00 and 6.30 days respectively (table no.-1). This finding of author is not match with findings of Kamani and Vyas (1985) who recorded the duration of 1st, 2nd, 3rd, 4th and 5th larval instars; 2.13, 4.63, 5.23, 5.85 and 6.42 days. Total larval period was from 22.80 to 27.82 days with an average of 25.05 days (table no.-1). The newly emergence pupa was bright yellow which gradually changed to dark brown. The length of pupa was 3.2 ± 0.8 mm across the thorax region while the width of pupa was 16.3 ± 2.5 mm. Total pupal period was 11.98 days (table no.-1 and graph no.-1). The adult was silvery white in colour. Length of male adult was 2.24 ± 0.60 mm. The length of female adult was 3.14 ± 0.85 mm. Life span of male and female was 2.95 and 3.18 days respectively (table no.-1). Total life span of the *T. nivella* was 49.42 ± 2.02 days (table no.-1). The present experimental finding of author cannot compare with the finding of Kamani and Vyas (1985) who recorded life span of male and female; 3.63 and 3.44 days respectively.

Table- 1: Showing the total life cycle of *T. nivella* (Fab.) at natural conditions during first experimental year; 01 April, 2011 to 31 March, 2012

Months	Incu. period (days)	Larval Instars (days)					Total Larval Period (days)	Pupal Period (days)	Adult		Total Life Span (days)
		1st Instar	2nd Instar	3rd Instar	4th Instar	5th Instar			Male	Female	
Apr.	9.4	2.13	4.63	5.28	5.85	6.42	24.31	14.12	3.42	----	48.78
May	7.4	2.96	4.15	5.85	6.43	5.83	25.22	10.31	-----	2.51	47.49
Jun.	7.3	3.10	5.83	5.19	4.57	7.13	27.82	10.15	-----	3.37	49.57
Jul.	8.7	2.24	4.83	5.56	5.96	6.67	25.26	11.01	2.13	-----	50.03
Aug.	7.6	2.54	5.85	5.37	6.33	6.95	27.04	11.14	-----	2.26	50.27
Sep.	8.5	3.02	5.63	5.02	5.13	6.01	24.81	12.51	-----	3.72	49.24
Oct.	8.9	2.36	4.82	5.76	6.32	7.03	26.09	12.12	2.93	-----	50.24
Nov.	9.6	2.45	4.34	5.29	5.14	5.76	22.88	11.78	3.41	-----	47.40
Dec.	9.7	2.08	5.43	5.01	6.12	7.03	24.37	13.86	-----	3.68	50.22
Jan.	10.4	2.43	5.16	4.98	5.86	6.72	24.55	12.34	2.43	-----	50.26
Feb.	8.4	2.86	4.43	5.39	5.96	5.46	22.80	12.13	3.40	-----	49.30
Mar.	8.9	2.97	4.96	4.93	6.34	5.32	25.52	12.33	-----	3.58	50.25
Range	7.3-10.54	2.08-3.10	4.15-5.85	4.93-5.85	4.57-6.43	5.32-7.13	22.80-27.82	10.15-14.12	2.13-3.42	2.26-3.72	47.40-50.27
Mean	8.73	2.56	5.01	5.30	6.00	6.36	25.05	11.98	2.95	3.18	49.42

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REFERENCES

1. Abdul Jabbar Rafiq, Masih Malik K.B. and Hashmi A.A. (1986): Incidence of sugarcane borers at Islamabad. *Journal of Agriculture Research*, 7 (2): 126-128.
2. Deka M.K. and Sharma P.C. (2005): Incidence of sugarcane top and internode borer and their natural parasitization. *Crop Research (Hisar)*, 30 (2): 259-262.
3. Halbe P.S. and Begal T.S. (1950): Studies on Top borer *Scirpophaga nivella* and its damage. *Sugarcane pests*, 11: 53-55.
4. Hugar S.V., Venkatesh Hosamani, Hanumanthaswamy B.C. and Pradeep, S. (2010): Comparative biology of yellow stem borer, *Scirpophaga incertulas* walker, (Lepidoptera: Pyraustidae) in aerobic and transplanted rice, *International Journal of Agricultural Sciences*, 6 (1): 160-163.
5. Kamani M.R. and Vyas H.M. (1985): Bionomics of Sugarcane top borer *Tryporyza (Scirpophaga) nivella* Fab. (Lepidoptera: Pyralidae) under Janagadh conditions, *Gujarat agriculture university research journal*, 10 (2): 23-26.
6. Malhi B.S. and Brar D.S. (1998): Biology of yellow stem borer, *Scirpophaga incertulas* (Walker) on basmati rice, *Journal of Insect Science*, 11 (2): 127-129.
7. Manager Singh, Verma S.K., Lal K. and Singh S.B. (2004): Effect of top borer (*Scirpophaga excerptalis* Wlk.) infestation on quality of jiggery, *Sugar Tech.*, 6 (3): 191-192.
8. Mukunthan P. (1985): Biology of sugarcane top borer and their new aspects, *Pesticide*, 11: 5-9.
9. Pala Ram and Lakhi Ram (2003): Studies on the biology of *Telenomus dignus* (Gahan) an egg parasitoid of yellow stem borer, *Scirpophaga incertulas* (Walker), *Journal of Insect Science (Ludhiana)*, 16 (1/2): 63-64.
10. Pandey K.P. and Singh R.G. (1997): Integrated management of top borer, *Scirpophaga excerptalis* in sugarcane, *Indian Sugar*, 46 (10): 803-804.
11. Permana A.D., Samoedi D, Zagatti P and Malosse C. (1995): Identification of pheromone components of sugar cane moth top borer, *Tryporiza nivella* F. (Lepidoptera: Pyralidae), *Bulletin-Pusat-Penelitian Perkebunan Gula-Indonesia*, 141: 80-85.
12. Rana Z.A., Mustaq M., Khalid M., Mahmood K., and Ahmad M., (1992): moth population fluctuation of sugarcane borer, *Journals Agriculture Research*, 30: 507-512.
13. Singh K.A., Verma K., Mitra and Singh (1984): Larval feeding behaviour of top borer, *Scirpophaga nivella* F. in relation to growth of sugarcane plant, *Entomon.*, 9: 69-70.
14. YouChashiens (1943): Studies on life history and damage caused by the borer in the cane, *Rev. Appl. Entomol.*, 31 (A): 121.