ISSN NO. 2320-5407

Journal homepage: http://www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

FECUNDITY OF SUGARCANE TOP BORER; TRYPORYZA (SCIRPOPHAGA) NIVELLA (FAB.) AT SOME DISTRICTS OF WESTERN UTTAR PRADESH

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Manuscript Info

Manuscript History:

Received: 15 September 2014
Final Accepted: 21 October 2014
Published Online: November 2014

Key words:
Fecundity, Sugarcane top borer; Tryporyza (Scirpophaga) nivella (Fab.), Sugarcane; Saccharum officinarum (Linn.).

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Abstract

Present investigation was carried out to study the fecundity of sugarcane top borer; Tryporyza nivella (Fab.) on sugarcane (Saccharum officinarum Linn.) at selected four sites in two experimental years. Some adults of Tryporyza nivella were collected from selected sites during first experimental year; April 2011 to March 2012 and they were released in self prepared net houses at selected sites for study. Fecundity of selected pest was carefully investigated with the help of hand lens at selected sites. Same study was carried out in laboratory conditions during second experimental year; April 2012 to March 2013 for which a sampling was made for collection of selected pest from all selected sites. In all collected insects, some healthy adults were put in polythene and transferred in plexiglass containers in laboratory and reared in B.O.D. chamber. Some pairs of healthy males and females were transferred in rearing cages for mating. The observations were closely recorded with the help of stereomicroscope with camera lucida, electron microscope and hand lens in laboratory conditions. During first experimental year, the fecundity of female Tryporyza nivella was recorded 212.75, 202.0, 208.8 and 211.45 eggs per female at first, second, third and fourth sites respectively however; the total fecundity was calculated about 215.34 eggs per female. During second experimental year; the fecundity was noted 67.4, 126.1, 142.6, 178.9 and 65.0 eggs per female at 40, 35, 32, 27 and 22 °C in the laboratory conditions. Fecundity increased with decreasing temperature till 27 °C than it decreased. Female Tryporyza nivella did not deposit her eggs below 22 and above 40 °C.

INTRODUCTION

Tryporyza nivella (Fab.); a major devastator pest of sugarcane, infests the top portion of sugarcane plant as stated Manager et. al. (2004); Deka and Sharma (2005) and Rossato et al. (2013) resulting; the production of cane reduces about 36-56 percent in accordance of Pandey et. al. (1997). Selected pest is taxonomically recognized as a member of family- Pyralidae. The family- Pyralidae further belongs to order- Lepidoptera of class- Hexapoda (Permana et. al., 1995). The life history of T. nivella showed complete metamorphosis with four developmental stages viz; egg, larva, pupa and adult (Kumar and Rana, 2013). Young larvae feed and bore into young leaves of sugarcane plant through its midrib (Singh et. al., 1984). The serious damage was occurred from third week of May to first week of July (Rana et al., 1992 and Gao et al., 2012). Present research work was carried out under taken as a test case to know the fecundity of T. nivella under field at selected sites as well as in laboratory conditions.

MATERIALS AND METHODS

To study the fecundity of selected pest, a sampling was carried out for collection of T. nivella at all four selected sites; Khayara village of District- Mathura, Gopalpura village of District- Aligarh, Nagla Radhey village of District-

Hathras and Nagla Kalua village of District- Etah in conformity of Cao et al. (2011) and Mujahid (2013). Collected adults were placed in polythene pouches in conformity of Mishra et al. (2012). After some time, collected insects were released in self prepared net houses at selected sites. The mating, oviposition, egg laying behaviour, incubation, hatching and fecundity of T. nivella were investigated with the help of hand lens in support of Besin and Reagan (1990), Shivasharanappa (2010) and Rao et al. (2013) and the observation were closely recorded at selected sites. A sampling was again conducted during second experimental year for collection of selected insect from all selected sites in which some healthy adults were placed in polythene pouches and then they were transferred in plexiglass containers in laboratory again in accordance of Mishra et al. (2012) and Abro et al. (2013). Rearing of collected pests was performed in B.O.D. chamber in conformity of Malhi and Brar (1998. For mating, some pairs of healthy males and females were transferred in rearing cages again as suggested Kalra et al. (1978). Females were allowed for oviposition on mesh net in accordance of Cheng et al. (1998). In laboratory, observations were caringly recorded with the help of stereomicroscope with camera lucida, electron microscope and hand lens in accordance of Malhi and Brar (1998) and Cheng et al. (1999).

RESULTS

Table 1 and graph I reveal that minimum and maximum fecundity was recorded 159.3 and 266.2 eggs per female with an average of 212.75 eggs per female at first site; Khayara village of district- Mathura while; at second site; Gopalpura village of district- Aligarh fecundity was recorded in ranging from 129.9 to 274.1 eggs per female with an average of 202.0 eggs per female. Moreover, at third site; Nagla Radhey village of district- Hathras minimum and maximum fecundity was recorded 146.7 and 270.9 eggs per female with an average of 208.8 per female. Fecundity was recorded in ranging from 163.7 to 259.2 eggs per female with an average of 211.45 eggs per female at fourth site; Nagla Kalua village of district- Eath. The mean of fecundity of all sites was calculated in ranging from 149.90 to 265.50 eggs per female with an average of 215.34 eggs per female. Fecundity was also investigated in laboratory conditions during second experimental and obtained data is presented in table- 2 and graph- II which show that the fecundity was recorded 67.4, 126.1, 142.6, 178.9 and 65.0 eggs per female at 40, 35, 32, 27 and 22 °C. Female did not lay eggs above 40 and below 22 °C. The suitable temperature was recorded 27 °C for egg laying.

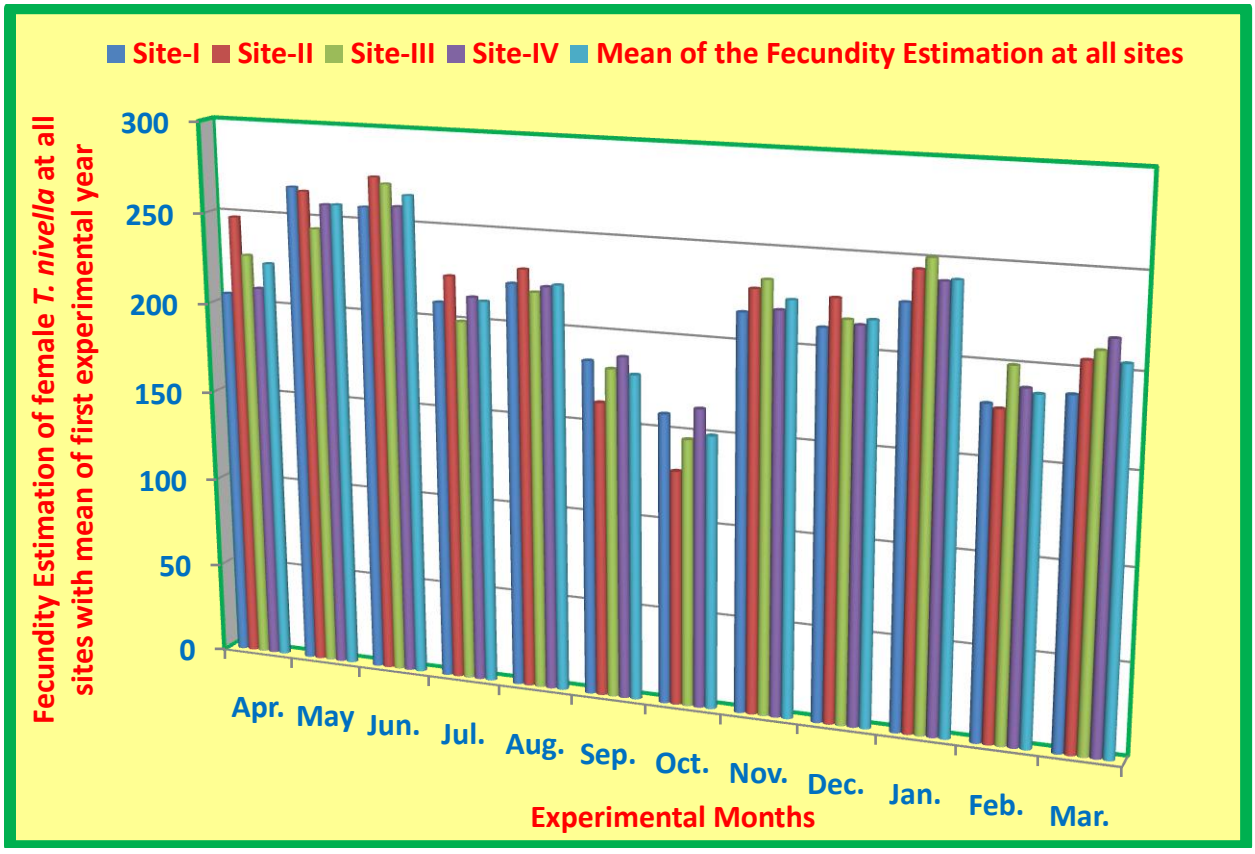
Table- 1 : Observations on the fecundity (average no. of eggs deposited by female) of T. nivella (Fab.) at four selected sites (Observation made on 10 female in each experiment).

Months	Fecundity (Average no. of eggs deposited by female) of four selected sites								Mean of the fecundity at all selected four sites
	Khayara vill. of Dist.- Mathura		Gopalpura vill. of Dis. Aligarh		Nagla Radhey vil. of D. Hathras		Nagla Kalua vill. of District- Etah		
	Range	Avrg. Mean	Range	Avrg Mean	Range	Avrg Mean	Range	Avrg Mean	
Apr.	194-216	205.1	202-270	247.8	192-260	227.1	196-232	209.2	222.3
May	260-272	266.2	250-270	264.3	220-265	244.3	240-276	257.8	258.1
June	248-268	257.8	264-290	274.1	258-289	270.9	256-263	259.2	265.5
July	190-231	209.3	168-276	223.9	176-220	199.8	193-234	213.4	211.6
Aug.	206-240	222.4	217-248	230.4	198-238	218.6	201-243	221.9	223.3
Sep.	170-199	184.3	150-180	162.3	168-197	180.9	179-197	187.8	178.8
Oct.	111-192	159.3	090-152	129.9	110-189	146.7	122-204	163.7	149.9
Nov.	203-228	216.4	202-240	229.0	212-236	234.1	198-243	218.9	224.6
Dec.	197-229	211.6	215-240	227.3	200-232	216.7	200-233	214.3	217.4
Jan.	211-243	227.6	232-255	244.7	246-260	250.9	228-253	239.6	240.7
Feb.	163-199	179.6	170-190	177.4	190-213	200.0	179-201	189.0	186.5
Mar.	172-201	187.7	200-220	205.5	196-230	210.8	207-228	217.3	205.3
Range	**159.3-266.2**		**129.9-274.1**		**146.7-270.9**		**163.7-259.2**		**149.90-265.50**
Mean	**212.75**		**202.00**		**208.8**		**211.45**		**215.34**

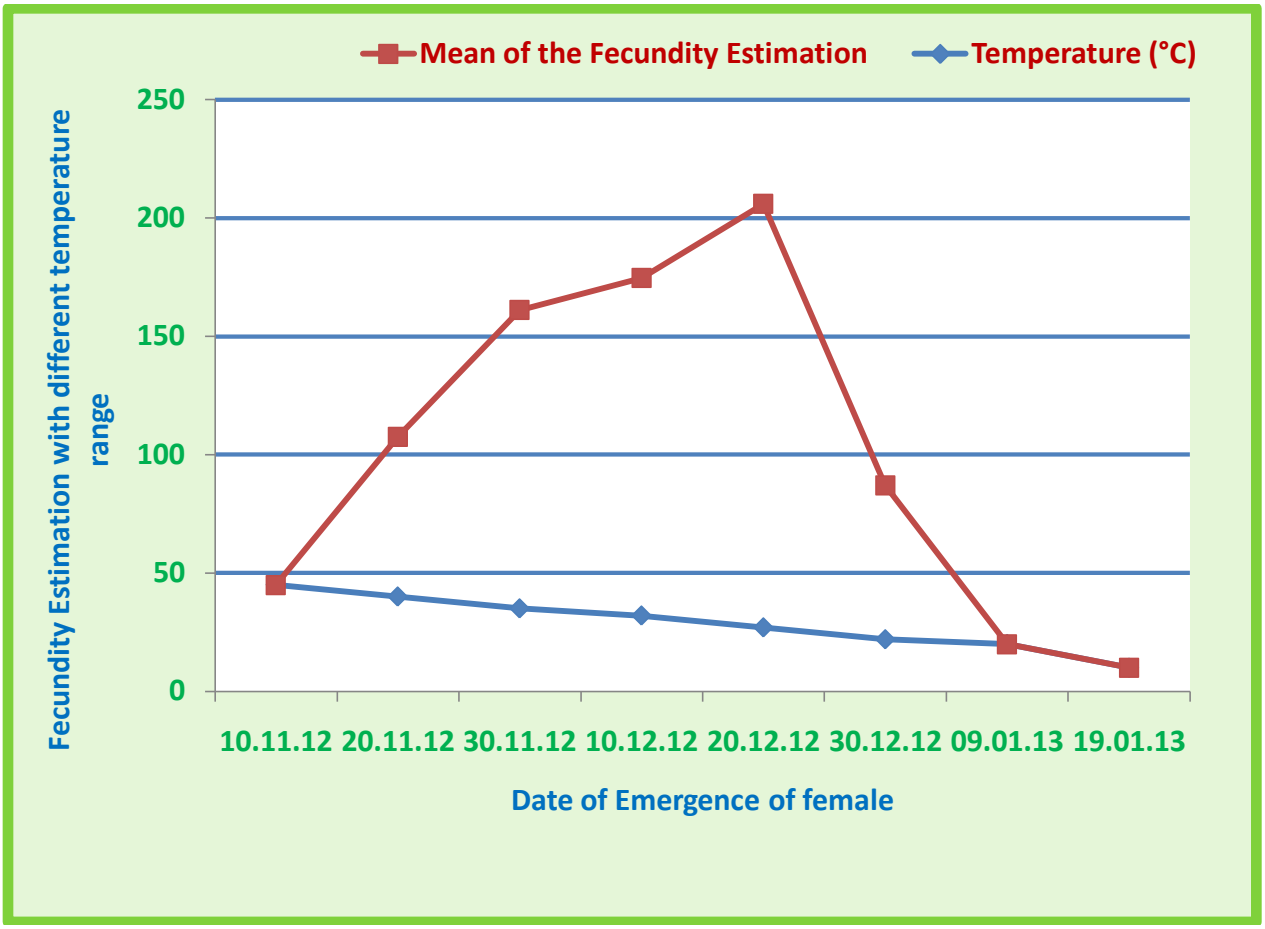
Table- 2 : Observation on the fecundity estimation of T. nivella (Fab.) in controlled condition. (Observation is based on 10 female in each experiment).

Sl. No.	Emergence date of female	Temperature (°C)	Range of fecundity	Mean of fecundity
1.	10 Nov., 2012	45	No egg deposition	Nil
2.	20 Nov., 2012	40	36-98	67.4
3.	30 Nov., 2012	35	118-134	126.1
4.	10 Dec., 2012	32	104-173	142.6
5.	20 Dec., 2012	27	163-198	178.9
6.	30 Dec., 2012	22	39-96	65.0
7.	09 Jan., 2013	20	No egg deposition	Nil
8.	19 Jan., 2013	10	No egg deposition	Nil

Graph- I : Relation on the fecundity estimation of T. nivella (Fab.) at all four selected sites.



Graph- II : Relation in the fecundity estimation with different temperature conditions T. nivella (Fab.) in laboratory. (Observation is based on 10 female in each experiment).



DISCUSSION

The findings of present investigation show the contradiction with the findings of Kamani and Vyas (1985) who reported that the fecundity of Tryporyza (Scirpophaga) nivella was 94.15 eggs per female however; in the present investigation, fecundity of female Tryporyza nivella was recorded 215.34 eggs per female. In laboratory conditions, fecundity increased ranging from 67.4 to 178.9 eggs per female with decreasing temperature from 40 to 27 °C than it decreased from 27 to 22 °C viz; when temperature decreased from 27 to 22 °C the fecundity decreased from 178.9 to 65.0 eggs per female in support of Mukunthan (1985) and Shi et al. (2013). It was also observed that above 40 °C and below 22 °C, female did not oviposit her eggs. In the present investigation while; Kamani and Vyas (1985) and Kaushik (2012) reported that female of Tryporyza nivella did not lay eggs at 20 °C.

CONCLUSION

The increase in the fecundity may be due to change in environmental factors for the development of selected pest. The temperature range from 27 to 35 °C is suitable for the egg development of T. nivella. The temperature below 27 and above 35 °C is unsuitable for the development of T. nivella egg because the fecundity is decreased below 27 and above 35 °C. The temperature above 40 °C acts as lethal temperature where female T. nivella does not deposit her egg.

ACKNOWLEDGEMENT

The author is highly indebted to The Secretary, Rajeev Gandhi Foundation for providing national fellowship to the author under guidance of Dr. K.S. Rana, Prof. & Head, the Department of Zoology, Agra College, Agra and to The Principal of Agra College, Agra for providing necessary facilities throughout the research work.

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