International Journal of Trend in Scientific Research and Development (IJTSRD)
International Open Access Journal
ISSN No: 2456 - 6470 | www.ijtsrd.com | Volume - 2 | Issue – 5

Management of Brinjal Shoot and Fruit Borer, *Leucinodes Orbonalis* Guenee Using Pheromone Trap (Tnau Master Trap) and Comparison between Commercial Water Trap and Tnau Master Trap

D. Indhu Mathi, Dr. G. Ravi, Dr. P. M. M. David
Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

ABSTRACT
Studies were taken up to understand the chemical ecology of Leucinodes orbonalis using sex pheromone trap for the management of L. orbonalis. Comparison made on moth retention pattern of commercial water trap and TNAU Master Trap and the result showed that mean number of moth catches in commercial water trap varies from 1.1 to 1.6 and was higher in TNAU Master trap (5.6 to 5.9 moths per trap). Average number of moth catches per trap per day in commercial water trap (1.3 ± 0.4) is much lesser than TNAU Master Trap which had a high level of moth recruitment (5.7 ± 0.4). TNAU Master Trap found better efficient results than the commercial water trap. The results of the experiment conducted using "Neoprene lure + TNAU Master trap" by pheromone trapping system at Deivaseyalpuram village indicated a higher moth catches ranged from 9.4 to 17.6 moths / trap / day.

Key Words: *Leucinodes orbonalis, TNAU Master trap, pheromone*

INTRODUCTION
Brinjal an economically important commercial crop, it is reported infestation by more than 36 pest species (Regupathy *et al*., 1997) from the time of its planting to harvest. The fruit and shoot borer, *Leucinodes orbonalis* Guenee is the key pest of brinjal (Latif *et al.*, 2010; Chakraborti and Sarkar, 2011; Saimandir and Gopal, 2012) inflicting sizeable damage in almost all the brinjal growing areas (Dutta *et al.*, 2011). Use of pheromones in *L. orbonalis* is a key technique in IPM. This technology also helps in avoiding unnecessary chemical sprays and timely application of pesticides when absolutely essential (Witzgall *et al*., 2010). Thus pheromone has a major role in brinjal IPM. The use of sex pheromones have been gaining importance throughout the world for mass trapping of *L. orbonalis* (Cork *et al*., 2003; Jhala *et al.*, 2005; Mandal *et al.*, 2005; Rath and Dash, 2005 and Bhanu *et al.*, 2007). Pheromone traps are effectively used for the early detection of the pest and to monitor its seasonal activity in order to schedule appropriate plant protection measures (Tiwari *et al*., 2009). Use of pheromone in monitoring and mass trapping also helps in avoiding unnecessary chemical sprays and timely application of pesticides when absolutely essential (Witzgall *et al*., 2010). Continuous monitoring aids in timely detection and early warning of the pest, identifying the peak of occurrence and timing of insecticidal application (Tiwari *et al*. , 2009).

1. MATERIALS AND METHODS:
1.1. Studies on Recruitment Pattern of Indigenous Pheromone Lure in TNAU Master Trap
This experiment was conducted in the brinjal field planted with KKM 1 brinjal variety. The experiment was conducted at Horticultural farm of the institute (TNAU, Killikulam), during the month of March 2017. Indigenous neoprene lure (Picture 1) was used in the experiment. Observations on moth catches recorded up to two months and data were tabulated. Data on extent of fruit damage (on number basis) during corresponding trap catch period was also recorded

Picture1. Indigenous neoprene lure

1.2. Moth Retention Pattern of Commercial Water Trap and TNAU Master Trap

This trail was conducted in the field of four months old KKM 1 brinjal crop at AC & RI, Killikulam in May 2017 to compare the efficiency of Commercial water trap and TNAU Master trap. Indigenous neoprene lure was used for the experiment. Observations were taken for four weeks. Number of moths collected in both the traps was counted at weekly interval. Comparison made by paired t test.

1.3. Moth Retention Pattern of TNAU Master Trap Placed in Different position

TNAU Master Trap was fixed in two different positions *viz*., on-ground and on- platform **(Picture 2).**The trap placed on the ground is considered as on ground position trap. In the platform type the trap was fixed on a plywood platform (1.25 ft x 1.25 ft) with the help of two feet stand. Observation was taken during the month of April. The brinjal field was planted with KKM 1 variety in which the trap was placed. Indigenous neoprene lure was used in the experiment. Data on moth catches taken over a period of four weeks at weekly interval. Five traps of each type were fixed in the field. On platform trail was conducted at Deivaseyalpuram village using TNAU Master trap (On-platform) in five replications **(Picture 3).** Observations were made in weekly interval from May 1st week to June 3rd week and data on moth catches per trap was tabulated.

a. On-ground

b. On- Platform

Picture2. TNAU Master trap

2. RESULTS AND DISCUSSION:

2.1. Studies on recruitment pattern of Indigenous pheromone lure in TNAU Master trap (Observatory trial)

Moth attraction and retention behavior of TNAU Master Trap fitted with indigenous neoprene lure was evaluated under field condition in observatory trial. The data are furnished in table 1. The mean number of moths recorded ranged from 4.9 to 7.5 moths / trap / day. Maximum moth catch (7.5 moths / trap) was observed during 1st week of April. Minimum moth catch (4.9 moths / trap) observed in 1st week of May. Fruit damage during corresponding period ranged from 20 per cent to 47.5 per cent. The extent of percent fruit damage observed was maximum (47.5%) in 2nd of April and a minimum damage was observed in 3rd week of May.

Table1. Studies on recruitment pattern of Indigenous pheromone lure in TNAU Master trap (Observatory trial)

S. No.	Month (Week)	Mean moth catches / trap/ day	Percentage of fruit damage %
1.	April week- I	7.5	45.3
2.	April week- II	7.3	47.5
3.	April week- III	5.5	42.2
4.	April week- IV	6.4	38.1
5.	May week-I	4.9	32.8
6.	May Week II	5.6	21.5
7.	May Week III	5.5	20

2.2. Moth retention pattern of commercial water trap and TNAU Master Trap

TNAU Master trap having the advantage of "no-water requirement" was compared for its efficiency with the commonly used water trap. Number of moth catches per trap per week was observed in commercial trap and TNAU Master Trap. Number of moth catches was significantly different between the two different trap designs studied (Figure 1). Mean number of moth catches in commercial water trap varies from 1.1 to 1.6 whereas in TNAU Mater trap mean number of moth catches varies from 5.6 to 5.9 (Table 2). Average number of moth catches per trap per week observed in commercial water trap (1.3 ± 0.4) is much lesser than TNAU Master Trap which had a high level of moth recruitment (5.7 ± 0.4).

Table2. Moth retention pattern of commercial water trap and TNAU Master trap (On station experiment)

NO	Mean number of moth catches / trap (Mean of 5 replication)		
	Commercial water trap	TNAU Master trap	*t* (P < 0.05)
1	1.6 ± 0.2 (1.43)	5.7 ± 0.4 (2.48)	8.6
2	1.3 ± 0.4 (1.27)	5.6 ± 0.2 (2.47)	6.9
3	1.2 ± 0.4 (1.25)	5.6 ± 0.4 (2.45)	6.6
4	1.1 ± 0.4 (1.22)	5.9 ± 0.4 (2.51)	6.8
Mean	1.3 ± 0.4 (1.30)	5.7 ± 0.4 (2.48)	14.2

Mean ± SE, NS = Non-significant, figures in parentheses are transformed values, n = 20.

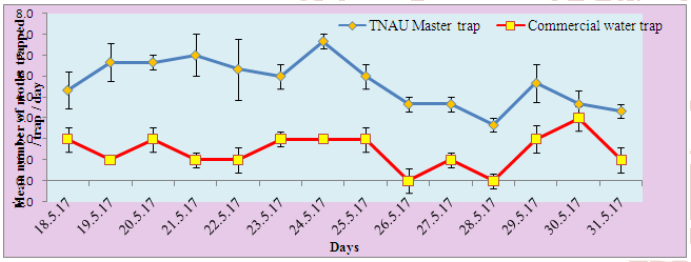

Figure1. Moth retention pattern of commercial water trap and TNAU Master trap

2.3. Moth Retention Pattern of TNAU Master Trap Placed In Different Position

Results of the experiment conducted to validate the impact of trap position on moth recruitment pattern of TNAU Master Trap are furnished in table 3. TNAU Master Trap was fixed in two positions *viz.*, Trap placed on ground level and canopy level. Number of moth catches per trap per week was observed in TNAU Master Trap placed in two different position. Data on moth catches taken for four weeks. There was a significant difference observed among two trap position studied (Figure 2). The number of moths observed in the trap placed at ground level varied between 0.2 to 1.5 whereas the trap placed in canopy level moth catches varies from 3.6 to 5.6. Average number of moth catches per trap per day in the trap placed at ground level (1.0 ± 0.2) was less than the trap placed in canopy level (4.9 ± 0.2).

The results of the on farm observation taken from brinjal crop in Deivaseyalpuram village from May 1st week to June 3rd week furnished in table 4. In the on-farm trail the number of moth catches ranged from 9.4 to 17.6 moths / trap / day. Maximum number (17.6) of mean moth catches was observed during June 2nd week (Plate 4). Minimum number (9.4) of moth catches observed during May 1st week.

Table3. Moth retention pattern of TNAU Master Trap placed in different position (On station experiment)

NO	Mean number of moths/trap (Mean of 5 replication)		
	On-platform	On -ground	*t* (P < 0.05)
1	4.7 ± 0.1 (2.27)	1.5 ± 0.1(1.40)	35.3
2	5.5 ± 0.2 (2.44)	1.5 ± 0.2(1.39)	11.7
3	5.6 ± 0.2 (2.47)	0.9 ± 0.2(1.16)	9.1
4	3.6 ± 0.2 (2.01)	0.2 ± 0.2(1.34)	4.8
Mean	4.9 ± 0.2 (2.31)	1.0 ± 0.2 (1.32)	10.3

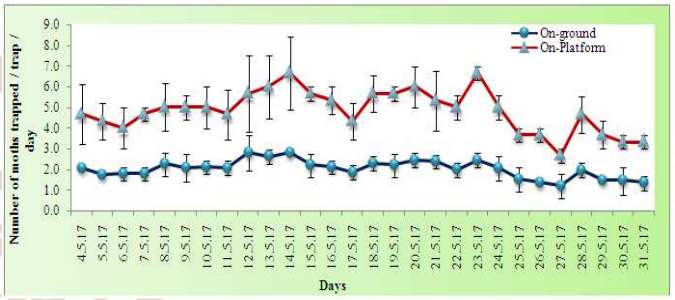

Figure2. Moth catch pattern of TNAU Master trap (On station experiment)

3. CONCLUSION:

In the study conducted on moth recruitment pattern of Indigenous pheromone lure in TNAU Master trap (Observatory trial), the mean number of moths recorded ranged from 4.9 to 7.5 moths / trap / day. Maximum moth catch (7.5 moths / trap/ day) was observed during 1st week of April. Minimum moth catch (4.9 moths / trap) observed in 1st week of May. Comparison made on moth retention pattern of commercial water trap and TNAU Master Trap and the result showed that mean number of moth catches in commercial water trap varies from 1.1 to 1.6 and

was higher in TNAU Mater trap (5.6 to 5.9 moths per trap). Average number of moth catches per trap per day in commercial water trap (1.3 ± 0.4) is much lesser than TNAU Master Trap which had a high level of moth recruitment (5.7 ± 0.4). TNAU Master Trap found better efficient results than the commercial water trap.

REFERENCE:

1. Alam, S. N., M. A. Rashid, F. M. A. Rouf, R. C. Jhala, J. R. Patel, S. Satpathy, T. M. Shivalingaswamy, S. Rai, I. Wahundeniya, A. Cork, C. Ammaranan and N. S. Talekar. 2003. Development of an integrated pest management strategy for egg plant fruit and shoot borer in South Asia. *Technical Bulletin 28*, AVRDC–The World Vegetable Center, Shanhua, Taiwan. pp. 66.
2. Beulah, R. 2015. Studies on pheromone dispensers for the management of brinjal shoot and *L. orbonalis* Gune. (Lepidoptera: Pyralidae). *Pest Mngt. Hort. Ecos.*, **13**: 115-121.
3. Bhanu, K. R. M., M. S. Prabhakara and K. P. Jayanth. 2007. Field evaluation of indigenously developed sex pheromone lures for mass trapping brinjal shoot and fruit borer *L. orbonalis* Gune. (Lepidoptera: Pyralidae). *Pest Mngt. Hort. Ecos.*, **13**: 115-121.
4. Chakraborti, S. and P. Sarkar. 2011. Management of *L. orbonalis* Gune. on Egg plants during the rainy season in India, *J. Pl. Prot. Res.*, **51**(4): 325-328.
5. Cork, A., S. N. Alam, F. M. A. Rouf and N. S. Talekar. 2003. Female pheromone of brinjal fruit and shoot borer, *L. orbonalis:* trap optimization and preliminary mass trapping trials. *Bull. Entomol. Res.*, **93**: 107-113.
6. Dutta, P., A. K. Singha, P. Das and S. Kalita. 2011. Management of brinjal fruit and shoot borer, *L. orbonalis* Gune. in agro-ecological condition of West Tripura. *Scholarly journal of Agricultural Science* **1**(2):16-19.
7. Howse, P., I. Stevens and O. Jones (Eds.). 1998. *Insect Pheromones and their use in Pest Management*. Chapman & Hill, London, UK, p. 639.
8. Jhala, R. C., J. R. Patel, R. H. Patel, T. M. Bharpoda, N. C. Patel, M. G. Patel, A. J. Chavda, Y. C. Patel and N. S. Talekar. 2005. Evaluation of ecofriendly integrated pest management components to combat eggplant shoot and fruit borer *(L. orbonalis* Gune.) in Gujarat. **In**: pp. 39-43. *National Symposium on Recent Advances in Integrated Management of Brinjal Shoot and Fruit Borer*, 3-4 Oct.
9. Kandasamy, K. 2016. Evaluation of indigenous sex pheromone trapping system for integration in shoot and fruit borer, *L. orbonalis* Gune. management in brinjal, *M.Sc (Ag.) Thesis*, Tamil Nadu Agricultural University, Coimbatore.
10. Latif, M. A; M. M. Rahman and M. Z. Alam. 2010 Efficacy of nine insecticides against shoot and fruit borer, *L. orbonalis* Gune. (Lepidoptera: Pyralidae) in eggplant. *J. Pest Sci.*, **83**(4): 391-397.
11. Mandal, D., K. Baral, H. Chattterjee and P. Mandal. 2005. Integrated pest management of eggplant shoot and fruit borer, *L. orbonalis* Gune. **In**: pp. 58-62. *National Symposium on Recent Advances in Integrated Management of Brinjal Shoot and Fruit Borer*, 3-4 Oct. 2005.
12. Rath, L. K. and B. Dash. 2005. Study on efficacy of a non chemical IPM module for the management of brinjal shoot and fruit borer. **In;** pp 63-66. *National Symposium on Recent Advances in Integrated Management of Brinjal Shoot and Fruit Borer*, 3-4 Oct.
13. Reghupathy, A., S. Palanisamy, N. Chandramohan and K. Gunathilagaraj. 1997. *A guide on crop pests*. Sooriya Desktop Publishers, Coimbatore. pp. 264.
14. Saimandir, J. and M. Gopal. 2012. Evaluation of synthetic and natural insecticides for the management of insect pest control of eggplant (*Solanum melongena* L.) and Pesticide Residue Dissipation Pattern. *American J. Pln. Sci*, **3**(2): 214-227.
15. Tiwari, G., C. S. Prasad and L. Nath. 2009. Moths trapping of Brinjal shoot and fruit borer, *L. orbonalis* (Gune.). *Ann. Pl. Protec. Sci.*, **17**(2): 319-321.
16. Uddin, A. B. M. A., S. N. Alam and M. Z. Alam. 2008. Effect of different pheromone trap designs and installation height in the brinjal field for catching brinjal shoot and fruit borer male moth. *Bangladesh J. Entomol.*, **18**(1): 11-21.
17. Witzgall, P., P. Kirsch and A. Cork. 2010. Sex Pheromones and Their Impact on Pest Management. *J. Chem. Ecol.*, **36**: 80-100.