MONITORING OF *SPODOPTERA LITURA* WITH SEX PHEROMONE TRAPS

GEETHA, S., JAGADISH, K. S., LATHA, H. C., JAMUNA, B. SHWETHA SURPUR

Abstract: The pattern of moth catches in pheromone traps indicated that the moth activity of *Spodoptera litura* was moderate during *Kharif*, 2012.The maximum numbers of adults were caught during first week of October and second week of December. The study revealed that there was a significant difference in moth catches across weeks. The correlation between the pheromone trap catches of *S. litura* with the weather parameters of preceeding week was found to be a non-significant, however, afternoon relative humidity (r= -0.283) and total rainfall (r= -0.059) were found have a negative effect on the trap catches. However, number of rainy days (r= 0.404), maximum temperature (r= 0.420), sunshine hours (r= 0.319), minimum temperature (r= 0.053) and morning relative humidity (r= 0.022) was found to have a positive effect on the pheromone trap catches of *S. litura*. Multiple linear regression equation suggests that weather parameters influenced the *S. litura* catches in pheromone trap to an extent of 63 per cent.

Keywords: Monitoring, Pheromone trap, *Spodoptera litura*, Sunflower.

Introduction: Sunflower (*Helianthus annuus*) is an annual plant, which is native of America. In India, during 2011-12, the area under sunflower cultivation was 7.219 lakh ha, with a total annual production of 4.999 lakh tonnes and productivity of 692 kg per ha. The cultivated sunflower is largely confined to south Indian peninsular states *viz.,* Karnataka, Andhra Pradesh, Maharashtra and Tamil Nadu. Globally, about 251 insect and acarine species have been recorded on sunflower (Rajmohan, 1976) of which, 51 species have been reported from India alone. In India the major pests includes capitulum borer *Helicoverpa armigera* (Hubner), green semilooper, *Thysanoplusia orichalcea* (Fab.), Bihar hairy caterpillar, *Spilarctia obliqua* (Walker), tobacco caterpillar, *Spodoptera litura* (Fab.), cabbage semilooper, *Trichoplusia* sp. (Hubner), cutworm, *Agrotis* sp. and leaf hopper, *Amrasca biguttula biguttula* (Ishida) economic importance (Basappa, 1995). Among the wide range of defoliators causing damage to sunflower, tobacco caterpillar, *Spodoptera litura* Fab. is one of the most destructive one and it is a polyphagous species, damaging several crop plants worldwide. It is known to cause losses ranging between 25.8 -100 per cent in crops such as, groundnut (Dhir *et al*, 1992); potato in India (Trivedi, 1988) and soybean in Japan (Higuchi *et al*., 1994). Chaudhari *et al.* (1999) reported that increase in mean temperature coupled with decrease in the mean relative humidity reduced the trap catches of *S. litura.*

Materials and Methods: The investigations were carried out during 2012-13 at the Zonal Agricultural Research Station, University of Agricultural Sciences, Ghandi Krushi Vignana Kendra, Bengaluru. The pheromone traps were placed in one acre sunflower crop, by maintaining two replications. The sex pheromone traps used for monitoring *S. litura* were procured from the M/s Bio-Pest Management Pvt. Limited, Bengaluru. The trap consisted of a smooth plastic funnel (10 cm diameter) and a plastic sleeve of 60 cm length. Each lure was replaced once in every three weeks. The counts were recorded on a daily basis and then the trapped moths were killed after each count. The data were then expressed as number of moths trapped/ week, which was then subjected to correlation and multiple linear regression analysis with meteorological parameters such as, total rainfall, number of rainy days, maximum temperature, minimum temperature, morning and afternoon relative humidity and bright sunshine hours. Except in case of number of rainy days and total rainfall, where the total was considered, in case of all other weather parameters the mean was considered and then correlated with the weekly trap catches. The weekly pheromone trap catches of *S. litura* was correlated with the weather variables of the preceeding week.

Result and discussion: The pattern of moth catches in pheromone traps indicated that the moth activity of *S. litura* was moderate during *Kharif*, 2012.The maximum numbers of adults were caught during first week of October and December (Table I). The study revealed that there was a significant difference in moth catches across weeks. This variation in trap catches was also observed by the Prasannakumar *et al*. (2012) in potato crop. The funnel width, height of the funnel and funnel diameter and components of the lure influenced the trap catches (Prasannakumar *et al*., 2009), which could be the probable reason for the differences in the trap catches observed in the present study. Moreover, Kulkarni (1989) also noticed this pest was active throughout the year at Dharwad. But more moth catches were seen from June to October, with peak moth activity during September. Singh and Sachan (1993) also recorded peaks of *S. litura* catches during the first week of September and between 40th and 43rd standard weeks. whereas the correlation between the pheromone trap catches of *S.*

litura with the weather parameters of preceeding week was found to be a non-significant, however, afternoon relative humidity (r= -0.283) and total rainfall (r= -0.059) were found have a negative effect on the trap catches. However, number of rainy days (r= 0.404), maximum temperature (r= 0.420), sunshine hours (r= 0.319), minimum temperature (r= 0.053) and morning relative humidity (r= 0.022) was found to have a positive effect on the pheromone trap catches of *S. litura* (Table II). To some extent the findings of Jagadish *et al*. (2007) and Prasanna kumar *et al*. (2012) reporting the negative impact of rainfall on the moth catches, are similar to the present findings. Multiple linear regression equation suggests that these weather parameters influenced the *S. litura* catches in pheromone trap to an extent of 63 per cent (Table III). Besides, the weather parameters had a negative impact on the adult emergence and their activity. The study clearly suggested that the performance of pheromone traps and lures will be influenced by the weather parameters.

References:

1. H. Basappa, "Insect pest Management in sunflower – innovative approaches subject matter workshop cum seminar on *integrated pest management in oilseeds*," October 10-17, 1995, Directorate of Oilseeds Research, Hyderabad, 1995.
2. G. B. Chaudhari, T. M. Bharpod, J. J. Patel, K. I. Patel, and J. R. Patel, Effect of weather on activity of cotton bollworms in middle Gujrat, *J. Agrometerol.*, 2nd ed. vol.1, 1999, pp. 137-274.
3. B. C. Dhir, H. K. Mohapatra, and B. Senapati, "Assessment of crop losses in groundnut due to tobacco caterpillar, *Spodoptera litura* (F)," *Indian J. Pl. Prot*., vol. 20, 1992, pp. 215-217.
4. H. Higuchi, H. Yamamoto, and Y. Suzuki, "Analysis of damage to soybeans infested by the common cutworm, *Spodoptera litura* (F). (Lepidoptera: Noctuidae)II Estimation of leaf area damaged by young larvae using spectral reflectivity," *Japanese J. Appl. Ent, Zool*., vol. 38, 1994, pp. 297-300.
5. K. S. Jagadish, K. Karuna, K. N. Geetha, Y. G. Shadakshari, K. T. Puttarangaswamy, and T. K. Nagarathna, "Monitoring of capitulum borer, *Helicoverpa armigera* (Hub.) and tobacco caterpillar, *Spodoptera litura* Fab. in sunflower using sex pheromone traps," *Env. and Ecol*., 25th special issue (4A), 2007, pp. 1399-1402.
6. K. A. Kulkarni, "Bio ecology and management of *Spodoptera litura* (F.) (Lepidoptera: Noctuidae) on groundnut (*Arachis hypogaea* L.)," *Ph. D. Thesis*. University of Agricultural Sciences, Dharwad, India. 1989.
7. N. R. Prasannakumar, A. K. Chakravarthy, and A. H. Naveen, "Influence of weather parameters on pheromone trap catches of potato cutworm, *Spodoptera litura* (Fabricius) (Lepidoptera : Noctuidae)," *Curr. Biotica*., 4th ed. vol. 5, 2012, pp. 508-512.
8. N. R. Prasannakumar, A. K. Chakravarthy, L. Vijaya kumar, and E. Gangappa, "Field trails with pheromone traps on major lepidopterous insect pests of five vegetable crops," *Pest Management in Hort. Ecosystems*., 1st ed. vol.15, 2009, pp. 17-27.
9. N. Rajamohan, "Pest complex of Sunflower," a bibliography PANS, vol. 20, 1976, pp. 546-563.
10. K. N. Singh, and G. C. Sachan, "Assessment of the use of sex pheromone traps in the management of *Spodoptera litura* F.," *Indian J. Pl. Prot*., 1st ed. vol. 21, 1993, pp. 7-13.
11. T. P. Trivedi, "Incidence of caterpillars on potato in Kolar, Karnataka," *Curr. Res*., UAS, Bangalore, vol. 17, 1988, p. 121.

* * *

Table I: Pheromone trap catches of *S. litura* in relation to weather parameters of preceeding week

SMW	*S. litura*	Total rainfall (mm)	No. of rainy days	Temp. (°C)		RH (%)		Sunshine (Hrs)
				Max.	Min.	Morn.	A/N	
20th – 26th Aug	1.5	2.6	0	29.0	19.4	91	46	4.6
27th – 2nd Sept	5.0	53.4	2	29.9	19.3	93	53	8.1
3nd – 9th Sept	14.0	19.6	2	26.2	19.0	92	60	1.7
10th –16th Sept	5.0	0.0	0	27.8	19.7	92	58	2.5
17th -23rd Sept	3.0	2.0	0	28.6	19.4	91	52	5.0
24th –30th Sept	33.5	0.0	0	30.4	19.2	90	46	8.5
1st – 7th Oct	69.0	27.2	3	30.3	19.4	93	49	7.4
8th – 14th Oct	5.0	9.8	1	29.3	19.2	91	49	6.2
15th – 21st Oct	5.0	0.0	0	29.8	19.4	88	48	4.0
22nd –28thOct	9.0	60.8	3	27.3	18.4	91	58	5.4
29th – 4th Nov	0.0	0.6	0	27.4	18.2	91	54	6.9
5th – 11th Nov	1.5	111.8	2	25.1	18.1	95	72	3.0
12th – 18th Nov	5.0	18.8	1	28.3	18.2	93	51	7.9
19th – 25th Nov	14.5	0.0	0	26.7	13.1	82	53	10.2
26th – 2nd Dec	11.5	19.4	1	28.3	17.0	84	45	6.5
3rd – 9th Dec	74.0	0.0	0	27.7	15.0	88	55	9.2
10th – 16th Dec	30.5	10.8	1	26.3	16.6	88	51	7.7
17th – 23rd Dec	18.5	0.0	0	28.6	14.7	87	51	9.7
24th – 31stDec.	6.0	0.0	0	27.1	15.0	89	49	7.5

SMW: Standerd Meterological Week

I: Correlation between pheromone trap catches of *S. litura* with weather parameters of preceeding week

	Tot. rainfall (mm)	No. of rainy days	Temp. (ºC)		RH (%)		Sunshine (Hrs.)
			Max.	Min.	Morn.	A/N	
S. litura moth catches	-0.059	0.404	0.420	0.053	0.022	-0.283	0.319

Table III: Regression equation of pheromone trap catches of *S. litura* with weather parameters of preceeding week

Pest	Regression equation	R^2 value
S. litura moth catches	Y^2=-714.062-0.544X_1+12.471X_2+19.213X_3-15.838X_4+4.085X_5+2.334X_6-3.454X_7	63

X_1=Total rainfall (mm)
X_2= Number of rainy days
X_3= Maximum temperature (°C)
X_4= Minimum temperature (°C)
X_5= Relative humidity (morning) (%)
X_6= Relative humidity (afternoon) (%)
X_7= Sunshine hours

***

SRF, MARS, Bio-control laboratory,UAS,Email-kallesh.geetha5@gmail.com.
Associate professor, Ph.D. Scholar, Department of Agricultural Entomology,
email Id: jamuna4510@gmail.com,Email-jagsan_san@yahoo.com,mail-lathaent@gmail.com.
UAS, GKVK, Bengaluru, Karnataka-560065