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Monitoring of *Spodoptera litura* Through Pheromone Traps on Cotton and Impact of Weather Parameters on Trap Catch

Key words : Correlation, Cotton,MLR analysis, Pheromone traps, *Spodoptera litura*.

Cotton (*Gossypium spp*.) is an important commercial crop and extensively cultivated fibre crop of the world. But, there has been a decline in production due to several pest problems and development of resistance in the bollworms including tobacco caterpillar, *Spodoptera litura*. The tobacco caterpillar, *S. litura* is one among the nine key pests on cotton, causing considerable yield losses, at times assuming serious pest status. Early detection of the pest is more important for its effective management. Pheromone baited traps were used to monitor the build up of a pest population in order to schedule the appropriate time for the use of insrcticides effectively. But various weather parameters are known to influence the population build up and trap catch of the *S. litura*. Thus, an overall view on the influence of weather parameters on pheromone trap is essential for development of effective pest management strategies. Hence, an attempt was made to know the influence of weather parameters on the trap catch of the tobacco caterpillar during *kharif* 2010-2011.

An experimental plot was selected for the studies on the incidence of *S. litura* through pheromone traps were carried out at Regional Agricultural Research Station (RARS), Lam, Guntur, Andhra Pradesh, during *kharif* 2010-2011. Two pheromone traps each baited with cis-9, trans-11-TDDA (compound A) and cis-9, trans-12-TDDA (compound B) lures were placed in a cotton field which was kept completely under unprotected conditions sown in the month of August. Moth counts were taken every day in the morning at 8 Am by untying the bottom end of polythene sleve and expressed as number of moth/trap/week. The lures were replaced for every 3 weeks and traps were maintained through out the crop period. Weather parameters like maximum and minimum temperatures, morning and evening relative humidity, sunshine hours and rainfall collected from meteorological observatory, RARS, Lam were used for correlation and regression studies. The standard week average data of 27 standard weeks regarding pheromone trap catch and weather data was subjected to correlation and regression analysis to know the relationship between pest incidence and weather parameters. The data was subjected to appropriate statistical package by MSTAT C.

The incidence of *S. litura* moth population at the time of sowing was 32.50 moths/trap/week *i.e.* 34th standard week (third week of August), there after the adult trap catches showed declining trend and low level of population was recorded up to last week of December ranging from 4.50 to 34.00 adults/trap/week.. The peak moth incidence was observed during 6th standard week (first week of February) with 157.50 moths/trap/week (Fig 1). The present findings are in agreement with Vishalakshmi (1997) and Lognathan (2000) who reported that the moth catches were peak during the 1st week of February.

The population levels were very low in September month recording lowest in second week of September with 4.50 moths/trap/week which differs from findings of Hendricks *et al*. (1995) who reported that low numbers of moths were captured during April due to the prevailing climatic conditions. High moth catches were recorded in January to first fortnight of February (102.00 to 157.50 moths/trap/week) when minimum temperature and evening relative humidity are low (Fig 1).

The study also revealed that the tobacco caterpillar, *S. litura* showed wide variations regarding the peak incidence (Fig 1) during crop period which was in accordance with observations of Ahmad (1988) and Prasad *et al.* (2008) who reported that there wide variations regarding the peak incidence.

Trap catches in Relation to Weather Parameters

Pheromone trap catches recorded during the period of experimentation, when correlated with maximum temperature and minimum temperature revealed that there is positive but non-significant correlation between the moth catches and maximum temperature, while it was negative but significant with minimum temperature (Table 1). The present findings derive support from Purnachandrarao (1991) and Rao *et al.* (2003) who reported that the incidence of *S. litura* had significant negative correlation with minimum temperature.

Fig 1. Pheromone Trap Catch of *S. litura* on Cotton during 2010-11 Season

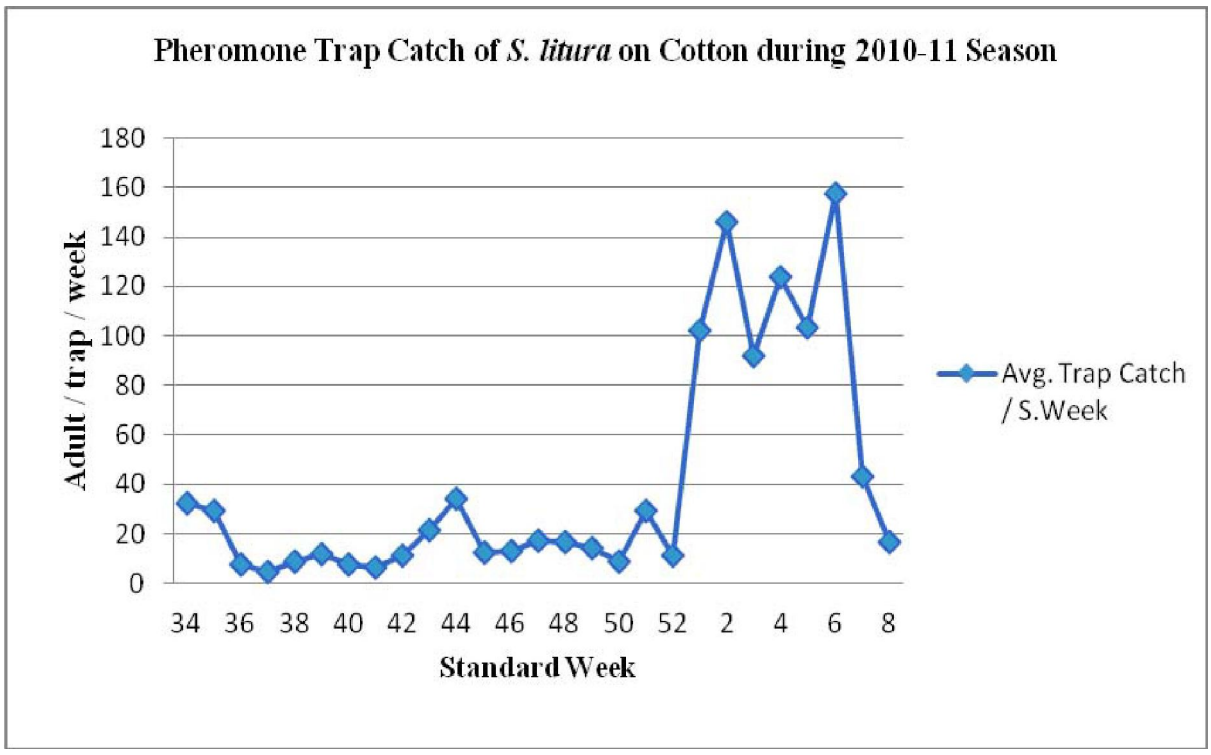

Table 1. Correlation between Weather parameters and Pheromone trap catch during *kharif,* 2010-11.

Pest	Correlation coefficient values					
	Max.temp	Min.temp	Mor. RH%	EVe. RH%	S.shine (hrs)	Rainfall (mm)
Spodoptera litura	0.079 NS	-0.715**	0.229 NS	-0.457*	0.566**	-0.379NS

* Significant at 5% level ** Significant at 1% level
NS – Non Significant
Multi Linear Regression Equation:

$Y = -27.67 + 9.19\ X_1 - 10.51\ X_2 + 0.61\ X_3 - 0.55\ X_4 - 3.07\ X_5 + 0.07\ X_6$ $R^2 = 0.62$

X_1 – Maximum temperature
X_2 – Minimum temperature
X_3 – Morning relative humidity
X_4 – Evening relative humidity
X_5 – Sun shine
X_6 –Rainfall

The relationship between the moth catches and morning relative humidity was positive and non-significant, while it was negative and significant with evening relative humidity (Table 1). The findings are in close conformity with the report of Lakshmisoujanya (2009) who has stated that the incidence of *S.litura* had significant correlation with evening relative humidity, and differ from Balasubramanian *et al*. (1985) who reported that there was a significant positive relationship between moths catch of *S. litura* and morning relative humidity.

The relationship between the moth catches and the sunshine hours was positive and significant while it was negative and significant with rainfall (Table 1). The present findings derive support from Sojitra (1990) who reported that the rainfall had negative correlation with moth catches and also in agreement with Singh *et al.* (1989) who reported that the moth catches were relatively low during the rainy season.

Multiple linear regression analysis was worked out between trap catch and with all the weather parameters and the analysis revealed that the cumulative effect of all the weather factors were non significant and together accounted for 62.00 per cent of total variation (R^2 = 0.62) on moth catches (Table 1). The results are in close conformity with Purnachandrarao (1991) and Thanki *et al*. (2003) findings of 66 per cent influence by all the parameters. While Nandihali *et al.* (1989) reported that the total variation was around 42 per cent and upto 54.43 per cent (Prasad *et al.,* 2008) due to all the weather parameters on moth catches.

LITERATURE CITED

Ahmad T R 1988. Field studies on sex pheromone trapping of cotton leafworm *Spodoptera littoralls* (Boisd.) (Lepidoptera:Noctuidae). *Journal of Applied Entomology* 105(1-5): 212-215.

Balasubramanian G, Chellaiah S and Balasubramanian M 1985. Studies on light trap and pheromone trap catches of *Spodoptera litura* Fab. Behavioural and physiological approaches in pest management. Tamil Nadu: 78-84.

Hendricks D E, Hubbard D W and Hardee D D 1995. Occurance of beet armyworm moths in cotton growing areas of the lower Mississippi river delta as indicated by numbers caught in pheromone traps from April to November. Proceedings Beltwide Cotton Conference, held at San Antonio, USA, 4-7 January 2: 802-804.

Lakshmisoujanya P 2009. Effect of *B.t.* toxins (Cry1Ac & Cry1Ac+Cry2Ab) on the development & management of bollworm complex with special reference to *Pectinophora gossypiella* (Saunders) & *Spodoptera litura* (Fabracius) on cotton. M. Sc Thesis, Acharya N.G Ranga Agricultural University, Hyderabad.

Lognathan M 2000. Monitoring of *Spodoptera litura* (F.) in tobacco using pheromone trap. *Journal of Experimental Zoology* 3(2): 141-142.

Nandihalli B S, Patil, B V, Somasekhar S and Hugar P 1989. Influence of weather parameters on the population dynamics of *Spodoptera litura* (Fab.) in pheromone and light traps. *Karnataka Journal of Agricultural Sciences* 2(1-2): 62-67.

Prasad N V V S D, Mahalakshmi M S and Rao N H P 2008. Monitoring of cotton bollworm through pheromone traps and impact of abiotic factors on trap catch. *Journal of Entomological Research* 32 (3): 187-192.

Purnachandrarao P 1991. Monitoring of *Spodoptera litura* Fab. on Chillies, Blackgram and Groundnut through pheromone traps and efficacy of some factors influencing trap catches. M. Sc Thesis, Acharya N.G Ranga Agricultural University, Hyderabad.

Rao J R, Babu B R and Krishnayya P V 2003. Correlation of weather parameters with the insect pests incidence on cauliflower. *Crop Research* 25(2): 341-346.

Singh K N and Sachan G C 1989. Asessment of the use of sex pheromone traps in the management of *Spodoptera litura* Fab. *Indian Journal of Plant Protection* 21: 7-13.

Sojitra B P 1990. Population dynamics of major soybean pests along with bionomics of gray semilooper, *Amyna octo* (Guenee) on different hosts and its chemical control. M. Sc Thesis, Gujarath Agricultural Unioversity, S.K. Nagar.

Thanki K V, Patel G P and Patel J R 2003. Population dynamics of *Spodoptera litura* on castor, *Ricinus communis*. *Indian Journal of Entomology* 65(3): 347-350.

Visalakshmi V 1997. Monitoring through pheromones and joint toxic action of chitin inhibitor and *Bacillus thuringiensis* with selected insecticides against *Spodoptera litura* and *Helicoverpa armigera* on Sunflower. M. Sc Thesis, Acharya N.G Ranga Agricultural University, Hyderabad.

Department of Entomology,
Agricultural College,
Bapatla 522 101,
Andhra Pradesh

P Pradeep,
N V V S D Prasad,
G Raghavaiah
V Srinivasa Rao

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