

Seasonal Incidence of Tobacco Caterpillar, *Spodoptera Litura* (Fabricius) Infesting Groundnut Crop at Raipur (Chhattisgarh)

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Abstract- The field experiment were conducted at Research Cum Instructional Farm at IGKV, Raipur (C.G.) during kharif 2018, to know the seasonal incidence of tobacco caterpillar, *Spodoptera litura* infesting groundnut. Tobacco caterpillar appeared during 37th standard meteorological week (SMW) with a mean population of 0.24 larva/plant. The peak population were observed in the second week of October with a mean population of 2.28 larva/plant. Thereafter, the population declined gradually and reached to a minimum level of 0.36 larva/plant during 44th SMW i.e. 29th Oct-04November. The correlation between tobacco caterpillar, *Spodoptera litura* and weather parameters during kharif 2018 results indicated that the population demonstrated a significant negative association with evening relative humidity ($r = -0.602$), while it showed significant positive association with maximum temperature ($r = 0.708$) and sunshine hours ($r = 0.626$). The population of tobacco caterpillar in groundnut had non-significant positive correlation with mean temperature ($r = 0.334$), while non significant negative correlation with rainfall ($r = -0.483$), minimum temperature ($r = -0.247$), morning relative humidity ($r = -0.531$) and wind velocity ($r = -0.414$).

Keywords- Correlation , Groundnut, incidence , *Spodoptera litura*,

I. INTRODUCTION

Groundnut or peanut is an important leguminous crop known for its multifarious uses including oil production, direct human consumption as food and also animal consumption in the form of hay, silage and cake. Being a grain legume, peanut has an important nutritional value for human beings, and its nutritional value has been exploited for combating malnutrition in children.

The major growing states are Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka, Rajasthan, and Maharashtra. These constituting and contributing around 80% of area and production^[1]. Groundnut is cultivated on 27.6 million ha with an annual production of 43.9 million metric tons globally. In India, groundnut is cultivated an area of 5.8 million ha, production of 6.85 million tones, and an average yield of 1182 kg /ha.

A large number of insect pests damage this crop. In India, about 115 insect pests species cause damage, of which only 9 species leafminer, white grub, jassids, thrips, aphid, tobacco caterpillar, gram caterpillar, red hairy caterpillar and termites are found to be economically important.

The tobacco caterpillar, *Spodoptera litura* (Fabricius) is one of the economically important and regular polyphagous pests on the field and horticultural crops^[2]. It is considered as one of the major threats to the present-day intensive agriculture and changing cropping patterns worldwide, next only to *Helicoverpa armigera* (Hubner). *Spodoptera litura* causing 26-100 per cent yield loss under field conditions^[3], more than 180 crops^[4].

The studies on seasonal incidence of insect pests and their natural enemies of groundnut crop and their correlation with the weather parameters provide basic information about seasonal occurrence of insect pests and their natural enemies. This

provides an opportunity for the development of management strategies significant for the control of these pests. These studies will support in devise the pest monitoring system and ecological sound integrated pest management modules.

II. MATERIALS AND METHODS

A field experiment was conducted at Research Cum Instructional Farm at IGKV, Raipur, (C.G.) during *kharif* 2018 under field condition to know the occurrence of insect pests on groundnut. The popular groundnut variety Jyoti was sown during *kharif* 2018 under natural conditions without spraying the insecticides in an area of 20 × 10 m. to record the incidence of insect pests.

To determine the seasonal incidence of insect pests on groundnut crop, weekly populations were recorded on randomly selected twenty five plants from four corners and center starting from 15 days after germination to the late stage of the cropping season.

The larval population of *S. litura* were recorded on five randomly selected plants in each quadrat and expressed as a per plant basis.

The data was statistically analysed by subjecting to the correlation between weather parameters and the population of insect pests which were determined using the Karl Pearson's coefficient of correlation formula :

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Where,

- r_{xy} = Simple correlation coefficient
 X = Variable *i.e.* abiotic component. (Average temperature, relative humidity and total rainfall)
 Y = Variable *i.e.* mean number of insect pests per plant
 N = Number of observations.

The correlation coefficient (r) values were subjected to the test of significance using t-test:

$$t = r \sqrt{\frac{n-2}{1-r^2}}$$

with degrees of freedom equal to $n - 2$

Where,

- r = Correlation Coefficient
 n = No. of observations

The calculated t-value obtained was compared with correlation coefficient table value at 5 % and 1% level of significance.

III. RESULTS AND DISCUSSION

Spodoptera litura appeared during 37th standard meteorological week (SMW) *i.e.* 10th-16th September (2nd week) with a mean population of 0.24 larva/plant. The population slowly increased and reached to its peak in the second week of October with a mean population of 2.28 larva/plant, when the mean atmospheric temperature and relative humidity were 27.6 °C and 69 per cent, respectively. Thereafter, the population declined gradually and reached to a minimum level of 0.36 larva/plant during 44th SMW *i.e.* 29thOct-04November.

The results indicated that the tobacco caterpillar, *Spodoptera litura* population exhibited a significant but negative correlation with evening relative humidity($r = -0.602$) (Fig.3.2). The regression equation being $y = -2.313 - 0.028x$ indicating that with an increase in 1% relative humidity there will be decrease in population by 0.028.

The tobacco caterpillar, *Spodoptera litura* showed significant positive correlation with maximum temperature ($r=0.708$) (Fig.3.3). The regression equation being $y=7.573-0.261x$ indicating that with an increase in 1°C temperature there will be increase in population by 0.261.

The tobacco caterpillar, *Spodoptera litura* showed significant positive correlation with sunshine hours ($r=0.626$) (Fig.3.4). The regression equation being $y=0.037-0.128x$ indicating that with an increase in 1 hours of sunshine there will be increase in population by 0.128.

The population of tobacco caterpillar in groundnut had non-significant positive correlation with mean temperature, while non significant negative correlation with rainfall, minimum temperature, morning relative humidity and wind velocity.

Similarly, Ahir *et al.*, (2017)^[5] also recorded the tobacco caterpillar population exhibited a significant negative correlation with relative humidity ($r = -0.647$) and total rainfall ($r = 0.536$) while, non significant correlation with mean atmosphere temperature. The minimum temperature, relative humidity and rainfall proving negative relationship with population of *S. litura* infesting groundnut crop. Similarly, Yadav *et al.* (2015)^[6] in blackgram also reported that population of *S. litura* showed non-significant negative correlation with rainfall and wind velocity while temperature (minimum and maximum), relative humidity (morning and evening) and sunshine showed a non significant positive correlation. More or less the present findings are also in agreement with the Madhukarrao (2015)^[7] studied on soybean who reported that correlation between minimum temperature and population of *S. litura* was negatively significant ($r= -0.641$) and with sunshine hours was positively significant ($r =0.637$). The present findings are contrary with Bhupendralal (2005)^[8] who reported that minimum temperature, morning relative humidity, evening relative humidity, average relative humidity were positive non-significantly correlated with tobacco caterpillar population in both *kharif* 2003 and summer 2004. Correlation between pest population and maximum temperature, average temperature, sunshine hours and rainfall were negative and non-significant while rainy days was positive but non-significant.

Table 1: Seasonal incidence of tobacco caterpillar, *S.litura* infesting groundnut variety Jyoti during kharif 2018

SMW No.	Avg. no. of <i>Spodoptera</i> larva/plant	Max. Temp. ($^{\circ}\text{C}$)	Min. Temp. ($^{\circ}\text{C}$)	Rain fall (mm)	RH (%) Mor.	RH (%) Eve.	Wind Velocity (Kmph)	Sun Shine (hours)
33	0	30.3	25.3	101.2	94	79	4.1	2.9
34	0	29.0	24.6	60.4	93	79	5.5	0.6
35	0	28.3	24.1	275.0	96	86	6.8	0.2
36	0	29.2	23.9	30.2	93	57	0.5	1.1
37	0.24	32.6	25.1	0.0	90	55	2.2	6.4
38	0.68	31.0	24.1	32.8	92	68	3.5	3.6
39	1	32.9	25.0	11.0	93	59	1.2	7.8
40	1.36	34.0	23.8	0.0	91	44	0.7	8.0
41	2.28	32.4	22.8	0.0	87	51	2.8	7.1
42	1	33.4	21.3	0.0	89	40	1.0	8.5
43	0.84	32.9	18.9	0.0	86	48	1.1	8.3
44	0.36	31.0	19.6	0.0	86	49	2.6	9.3
Correlation coefficient (r)		0.708**	-0.247	-0.483	-0.531	-0.602*	-0.414	0.626*

*Significant at 5% level of significance
SMW: Standard Meteorological Week

**Significant at 1% level of significance

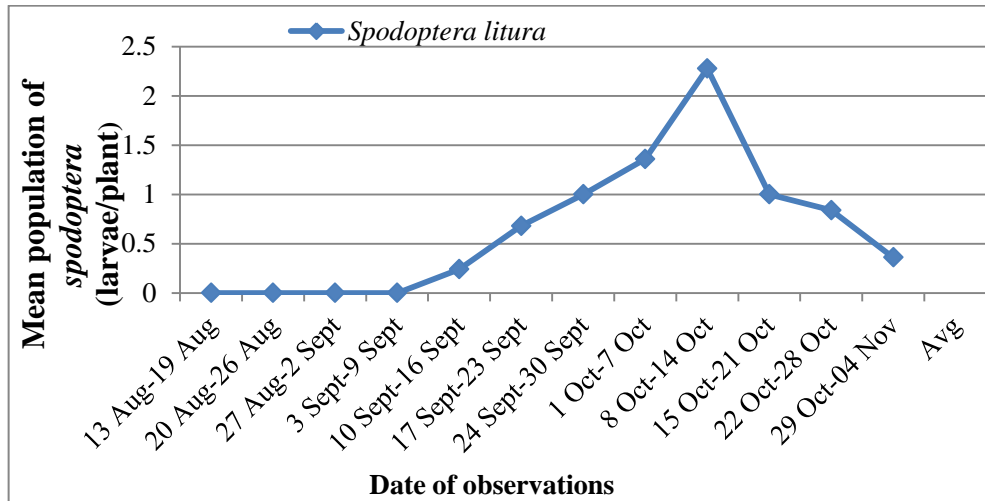


Fig.3.1: Mean population of tobacco caterpillar, *S.litura* during kharif 2018

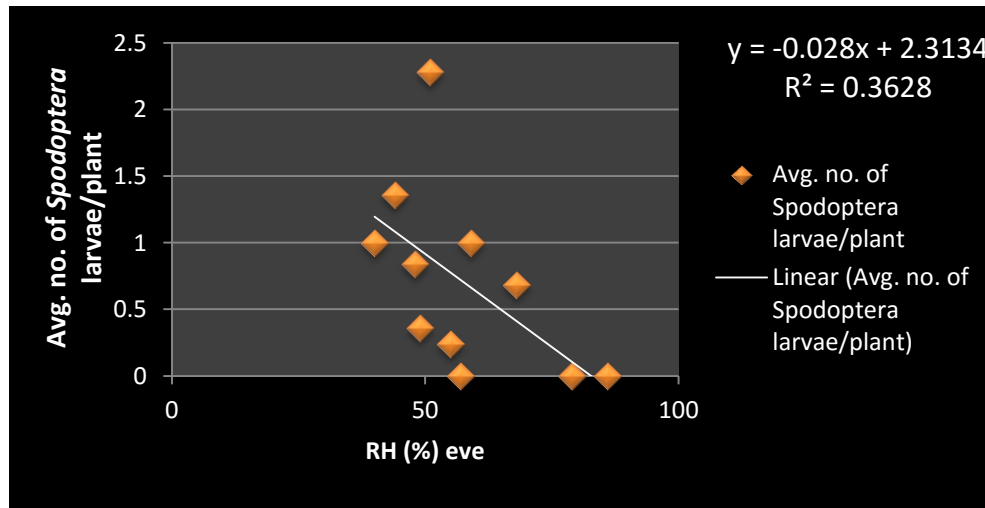


Fig.3.2: Regression equation between RH(%) eve. and population buildup of tobacco caterpillar, *S.litura*.

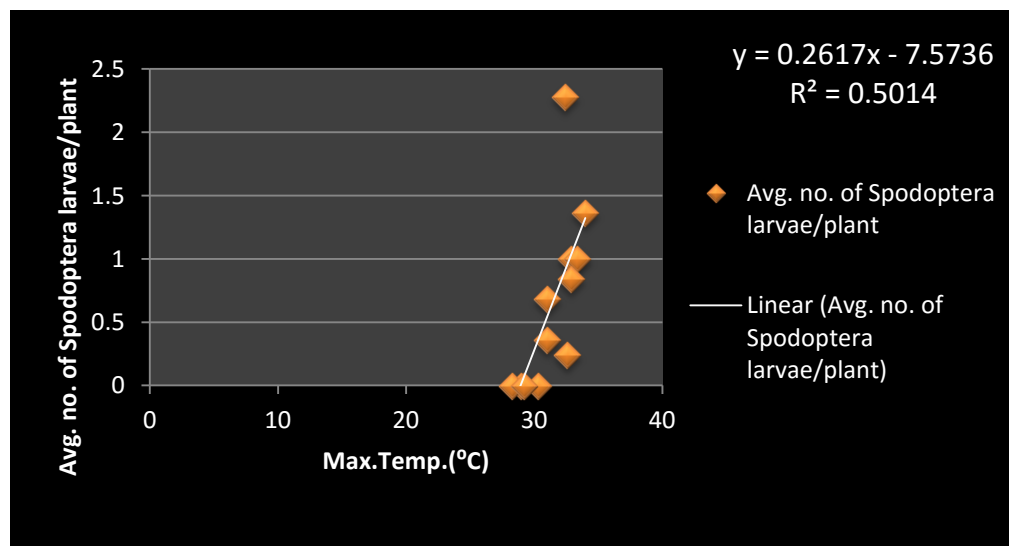


Fig.3.3: Regression equation between Max.Temp.(°C) and population buildup of tobacco caterpillar, *S.litura*.

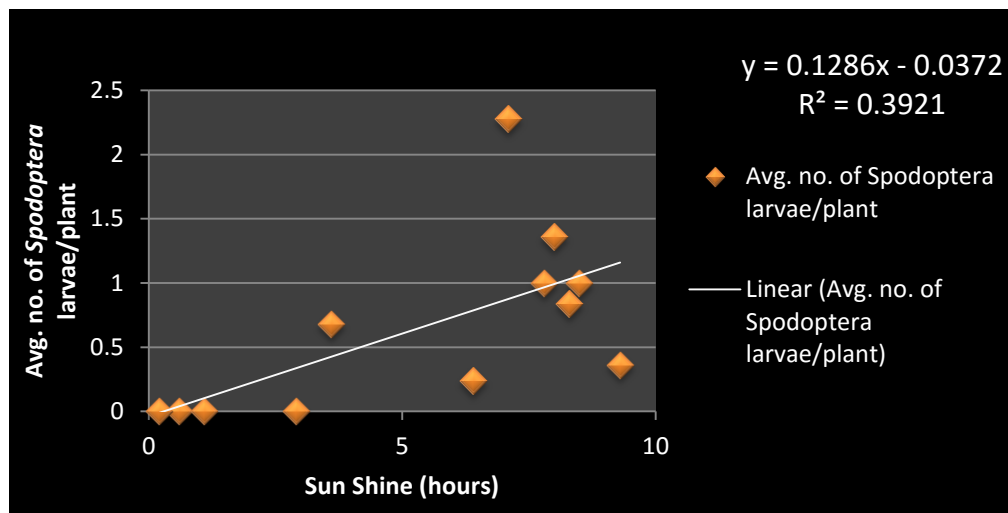


Fig.3.4: Regression equation between Sun Shine (hours) and population buildup of tobacco caterpillar, *S.litura*.

IV. CONCLUSION

The infestation of *Spodoptera litura* started during 37th standard meteorological week (SMW) i.e. 10th -16th September (2nd week) with mean population of 0.24 larva/plant. The population reached to its peak in the second week of October with a mean population of 2.28 larva/plant. The correlation between tobacco caterpillar, *Spodoptera litura* and weather parameters during kharif 2018 results indicated that the population demonstrated a significant negative association with evening relative humidity ($r = 0.602$) which means population of *spodoptera litura* decreases as evening relative humidity increases, while it showed significant positive association with maximum temperature ($r = 0.708$) and sunshine hours ($r = 0.626$). The increase in maximum temperature and sunshine hours favours the population buildup of tobacco caterpillar.

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