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SEASONAL INCIDENCE OF TOBACCO CATERPILLAR, *Spodoptera litura* IN BLACKGRAM, *Vigna mungo* (Linn.) DURING *Rabi* 2021 AND ITS CORRELATION WITH WEATHER PARAMETERS

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Field experiments were carried out to study the incidence of *S.litura* in blackgram during *Rabi* 2021 at Department of Entomology, Annamalai University, Annamalai Nagar. Highest larval incidence of *S.litura* on blackgram were noticed on 10th standard meteorological week (SMW) (3.91 larvae/mrl) followed by 9th SMW (3.87 larvae/mrl) and 8th SMW (2.85 larvae/mrl) and 7th SMW (1.72 larvae/mrl). Correlation between weather parameters on larval incidence of *S.litura* revealed that maximum temperature (0.547), minimum temperature (0.580) showed significantly positive association with mean larvae population of *S.litura*, whereas morning relative humidity (-0.175), evening relative humidity (-0.198) and rainfall (-0.389) were negatively correlated with mean larval population of *S.litura*. Regression model indicated that increase in 1^{0}C of maximum temperature or 1^{0}C of minimum temperature, 1% morning RH, 1% evening RH increased the mean larval population of *S.litura* by 0.045, 0.794, 0.0893 and 0.002 larvae/mrl during *Rabi* 2021 respectively.

Keywords: SMW- Standard meteorological week; MRL-Meter row length; regression; temperature; relative humidity; rainfall.

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1. INTRODUCTION

Pulses are rich source of proteins and occupies second most important constituent in our Indian diet only after cereals. Blackgram, *Vigna mungo* (Linn.) is also known as urd bean, mash, mungbean, mashkalai black mapte etc., which is native to the Indian subcontinent [1] belongs to family leguminosae and sub family papilionaceae. In India, the area, production, productivity of Black gram is 36.24 lac ha , 19.45 lac tonnes and 537 kg/ha respectively. In Tamil Nadu, the area, production and productivity of blackgram are 3.95 lakh ha, 2.76 lakh tonnes and 699 kg/ha respectively [2]. In India, the quantitative avoidable yield loss in black gram by insect pest complex is nearly 7-35% vary with different agroclimatic condition [3].

The tobacco leaf eating caterpillar, *Spodoptera litura* Fab.is a serious polyphagous noctuid pest which has constant association with many agricultural crops causing losses to pulses, oilseeds, vegetables *etc*. *S. litura* plays a premier role in economic losses of blackgram crop [4]. *S.litura* outbreaks occur as a result of insecticide resistance, favourable weather conditions, and heavy rainfall following a long dry spell [5]. With this in mind, the current study was carried out to determine the seasonal incidence of insect pests on blackgram and their relationship with weather parameters.

2. MATERIALS AND METHODS

The observations on seasonal incidence of *Spodoptera litura* on blackgram were recorded during *Rabi* 2021) by conducting field experiments at Department of Entomology, Faculty of Agriculture, Annamalai nagar, Chidambaram, Tamil Nadu. Vamban-4 variety is sown with spacing and plot size of 30 ×15cm and 5×4m. Except plant protection measures, all the agronomic practices were taken at field. The meteorological data were collected from meteorological observatory, Faculty of Agriculture, Annamalai university, Annamalai nagar. The incidence of larval populations of *S.litura* were recorded from a randomly selected meter row. Mean larval population of *S.litura* were pooled and expressed in weekly interval.

The data on periodical incidence of *S. litura* on black gram during *Rabi* 2021 were compiled and correlated with abiotic factors such as maximum temperature, minimum temperature (^{0}C), rainfall, relative humidity. To work out correlation studies, mean weather data which prevailed seven days before each observations of incidence were calculated. According to Gomez and Gomez [6], the data was analysed using multiple correlation and regression to investigate the relationship between weather parameters and the percent incidence of larvae/mrl.

3. RESULTS AND DISCUSSION

3.1 Seasonal Incidence of *S.litura* on Blackgram during *Rabi* 2021

Field experiments were carried out during *Rabi 2021* to study the seasonal incidence of *S.litura* on blackgram at Department of Entomology, Faculty of Agriculture,Annamalai nagar.

In *Rabi* 2021, the larval incidence of *S.litura* on blackgram recorded from 4th standard meteorological week (SMW) to 10th standard meteorological week (SMW) ranging from 0.17-3.91 larvae/mrl. Highest larval incidence of *S.litura* on black gram were noticed on 10th standard meteorological week (SMW) (3.91 larvae/mrl) followed by 9th SMW (3.87 larvae/mrl) and 8th SMW (2.85 larvae/mrl) and 7th SMW (1.72 larvae/mrl). These findings are coincided with the findings of Khan and Talukder [7], who observed larval incidence of *S.litura* on 5th SMW and partially similar with findings of Bhatt and Karnatak [8].

3.2 Correlation of Weather Parameters on Larval Incidence of *S.litura* during *Rabi* 2021

The results of correlation between weather parameters on larval incidence of *S.litura* during *Rabi* 2021 revealed that maximum temperature (0.547), minimum temperature (0.580) showed non-significantly positive association with mean larvae population of *S.litura*, whereas morning relative humidity (-0.175), evening relative humidity (-0.198) and rainfall (-0.389) were negatively correlated with mean larval population of *S.litura*. These findings are similar with findings of Pazhanisamy et al. [9] who observed that maximum temperature, minimum temperature, minimum temperature exhibited significant positive relationship with larval incidence of *S.litura*, whereas relative humidity exhibited negative correlation with larval incidence of *S.litura* in groundnut during *Rabi* 2010 and 2011. Our findings coincided with the findings of Radhika [10], Khan and Talukder [7] and Gaikwad et al. [11].

3.3 Multiple Regression Analysis of Weather Parameters on incidence of *S.litura*

Multiple regression between mean larval population of *S.litura* and weather factors in blackgram during

Rabi 2021.After the step wise regression analysis between weather parameters and mean larval population of *S.litura* in blackgram, the regression equation was

Rabi 2021 Y = -25.23+0.045 X1+0.794 X2 + 0.089X3+0.002X4-0.008X5

X1 = Maximum temperature X2= Minimum temperature
X3 = Morning relative humidity X4= Evening relative humidity X5= Rainfall

The pooled coefficient of determination (R^2) between weather parameters and mean larval population of *S.litura* on blackgram is 0.516. Multiple regression analysis indicated that maximum temperature, minimum temperature, morning relative humidity, evening relative humidity exhibited a positive influence on incidence of mean larval population of *S.litura*/mrl. But, rainfall exhibited negative influence on incidence of mean larval population of *S.litura*/mrl during rabi 2021 respectively.

Regression model indicated that increase in 1^0C of maximum temperature or 1^0Cof minimum temperature, 1% morning RH, 1% evening RH increased the mean larval population of *S.litura* by 0.045, 0.794, 0.0893 and 0.002 larvae/mrl during *Rabi* 2021 respectively. The values of co-efficient of determination (r^2) indicated that during *Rabi* 2021, 51.6% variation in mean larval population of *S.litura* recorded due to meteorological factors. These findings are similar with Sathya [12] who reported that rainfall exhibited negative influence on larval incidence of *S.litura* during *Rabi* season 2017. Also, these findings are in similar with findings of Selvaraj et al. [13].

Table 1. Population dynamics of *S.litura* on Blackgram and weather parameters during *Rabi* 2021

SMW	Period	Max. Temp. (^{0}c)	Mini. Temp. (^{0}c)	RH (%)		Rainfall (mm)	Average no. larval population of. *S.litura* / meter row length
				Morn. RH	Even. RH		
2	08 Jan- 14	27.70	21.90	96.00	87.00	247.20	0.00
3	15-21	28.80	21.60	91.00	78.00	12.80	0.00
4	22-29	30.30	21.20	91.00	90.00	0.00	0.17
5	30 Jan- 5 Feb	29.70	21.40	89.00	81.00	0.00	0.39
6	6-12 Feb	28.60	20.40	89.00	77.00	0.00	1.68
7	13-19	30.80	20.90	89.00	76.00	0.00	1.72
8	20-26	33.40	23.20	88.00	79.00	0.00	2.85
9	27-06 Mar	30.80	23.50	91.00	80.00	0.00	3.87
10	7-13 march	32.10	23.00	88.00	82.00	0.00	3.91
11	14-20	33.40	23.20	88.00	70.00	0.00	1.65
12	21-27	33.10	23.30	75.00	68.00	0.00	1.35

Mean of Four replications
Date of Sowing : 8.1.2021
SMW- Standard meteorological week

Table 2. Correlation between meteorological parameters and population dynamics of *S.litura* during *Rabi* 2021

Weather parameters	*Rabi* 2021
Maximum temperature	0.547
Minimum temperature	0.580
Morning relative humidity	-0.175
Evening relative humidity	-0.198
Rainfall	-0.389

**Significant at 5 percent level*
***Significant at 1 percent level*

Table 3. Multiple linear regression analysis between *S.litura* larval population and meteorological parameters during *Rabi* 2021

Rabi 2021		
Variable (Y)	**Regression equation**	**R^2 Value**
S.litura	Y= -25.23+0.045 X1+0.794 X2* + 0.089X3+0.002X4-0.008X5	0.516

**Significant at 5 percent level*
***Significant at 1 percent level*

4. CONCLUSION

One of the most important goals of pest management is to investigate the seasonal occurrence of insect pests. This provides information on seasonal variations and peak activity of *S.litura*. Correlation studies of insect pest populations with weather parameters reveal information about the impact of weather on populations of *S.litura*. The data and information obtained from this study will be extremely beneficial in management of *S.litura* in blackgram.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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