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Seasonal Incidence of Spotted Pod Borer [*Maruca Vitrata* (Geyer); Pyralidae; Lepidoptera] on Blackgram.

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ABSTRACT

Field experiment was conducted to study the seasonal incidence of spotted pod borer, *Maruca vitrata* (Geyer) (Pyralidae: Lepidoptera) on blackgram at Agricultural College Farm, Bapatla during *rabi* 2007-08.The larval incidence of *M. vitrata* started during the third week of December (15.12.2007) *i.e.*at the early flowering stage of the crop (30 days after sowing) and reached the peak level (37 larvae per 50 plants) during the second week of January (12.01.08) coinciding with the maximum flowering stage of the crop. The pest has disappeared by the maturity stage of blackgram. Among the biotic and abiotic factors, minimum temperature was significant and negatively correlated (r = -0.5551) with larval incidence of *M. vitrata* while the morning relative humidity was significant and positively correlated (r = 0.7235). The biotic and abiotic factors together were able to cause the variation in the larval incidence of *M. vitrata* to the extent of 94.90 per cent (r^2 = 09490) among which morning relative humidity was able to cause significant (b = 2.699) variation in the larval incidence of *M. vitrata.*

Key words : Blackgram,*Maruca vitrata,* Spotted pod borer, Seasonal incidence.

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The pulses occupy a special role in diet of human beings being a rich source of proteins with high nutritional value. Pulses contain nearly 30 per cent proteins which are nearly three times as much as cereals. Blackgram, *Vigna mungo* (L.) Hepper is the fourth important pulse crop in India and the second most important crop in Andhra Pradesh in terms of extent of cultivation. It is being cultivated as rice fallow *rabi* pulse crop in Andhra Pradesh in an area of 4.27 lakh ha with a production of 2.59 mt. (Ministry of Agriculture, 2007). Blackgram is damaged by more than 64 species of insect pests (Lal, 1985) among which pod borers are important in causing damage mainly at reproductive stage of the crop. Important pod borers of blackgram are spotted pod borer, *Maruca vitrata* (Geyer), tobacco caterpillar, *Spodoptera litura* (Fabricius), gram pod borer, *Helicoverpa armigera* (Hubner) and blue butterfly, *Lampides boeticus* (L.). Of these, spotted pod borer, *M. vitrata* has become a serious pest on rice fallow *rabi* blackgram and assumed the major pest status causing 20-60 per cent losses in grain yield (Singh and Allen, 1980).

MATERIAL AND METHODS

A bulk plot of 200m^2 with a blackgram variety LBG-648 was raised and maintained without any insecticidal application to study the seasonal occurrence of spotted pod borer, *M.vitrata* in relation to weather parameters *viz.,* maximum temperature, minimum temperature, morning and evening relative humidity and rainfall. The crop was sown on 10.11.07. The incidence of the major pest spotted pod borer, *M.vitrata* was recorded at weekly interval on fifty randomly selected plants at five different locations @ ten plants per location from one week after sowing and continued till the crop maturity. The observations were taken by counting the number of larvae per plant and number of damaged flowers per plant on the selected plants. The incidence of natural enemies was also observed simultaneously on the fifty randomly selected plants. The number of coccinellid predators and spiders per plant was recorded at weekly interval from one week after sowing. The influence of abitoic factors on the occurrence of spotted pod borer, *M. vitrata* on blackgram was analyzed statistically by subjecting the number of *M. vitrata* larvae as well as predators per 50 plants and weather data to simple correlation and Multiple Linear Regression (MLR) analysis (Gomez and Gomez, 1994).

RESULTS AND DISCUSSION

The initial incidence of *M. vitrata* was observed during the third week of December (15.12.2007) *i.e.* at the early flowering stage of the crop with four larvae per 50 plants. The prevailing average maximum and minimum temperatures during the period were 30.05 and 20.02^{0}C, respectively while the average morning and evening relative humidities were 90.00 and 75.71 per cent, respectively. The population of spiders and cocinellids during this period was five

Table 1. Influence of abiotic and biotic factors on the seasonal incidence of spotted pod borer, *Maruca vitrata* on blackgram during *rabi* 2007-08.

Date of observation	Temperature (°C)		Relative Humidity (%)		Rainfall (mm)	Maruca Larvae per 50 plants	Natural Enemies / 50 plants	
	Max	Min	Morning	Evening			Coccinellids	Spiders
17.11.07	31.05	18.72	82.57	62.57	0.185	0	0	0
24.11.07	30.34	19.30	83.50	68.57	—	0	0	0
1.12.07	30.98	18.95	84.14	65.28	—	0	3	4
8.12.07	30.54	19.32	84.14	69.85	—	0	3	5
15.12.07	30.05	20.02	90.00	75.71	—	4	4	5
22.12.07	29.98	19.02	85.00	68.28	0.285	14	6	5
29.12.07	31.55	17.52	90.00	66.00	—	22	3	4
5.1.08	30.52	17.35	93.42	62.57	—	30	2	5
12.1.08	30.25	16.05	94.28	63.00	—	37	2	3
19.1.08	30.15	17.41	94.00	68.14	—	29	2	3
26.1.08	29.51	17.91	90.42	72.57	—	21	2	3
3.2.08	29.97	19.87	91.14	69.42	—	12	0	1
10.2.08	30.21	21.57	89.14	80.00	—	8	0	0
17.2.08	35.28	30.07	92.85	81.85	—	0	0	0

Table 2. Correlation between *M.vitrata* incidence on blackram and abiotic and biotic factors during *rabi* 2007-08.

	Variable	Correlation coefficient (r)
X_1	Maximum temperature (°C)	-0.3225 NS
X_2	Minimum temperature (°C)	-0.5551*
X_3	Morning relative humidity (%)	0.7235*
X_4	Evening relative humidity (%)	-0.4055NS
X_5	Rain fall (mm)	-0.1175 NS
X_6	Spiders	0.3396 NS
X_7	Coccinellids	0.1901 NS

and four per 50 plants, respectively. The pest population increased gradually and the peak incidence was recorded during the second week of January (12.01.2008) *i.e.* at the maximum flowering stage with 37 larvae per 50 plants (Table 1). Lakshmi (2001) reported that the larval incidence was more in January coinciding with the maximum flowering and podding stage of blackgram. Later, the pest population has gradually declined and reached minimum by the second week of February with eight larvae per 50 plants and by the third week of February the pest has disappeared.

The results (Table.2) indicated that the larval population and the maximum temperature were negatively correlated but non-significant (r = -0.3225) while the correlation between the larval population and minimum temperature was negative and significant (r = -0.5551). There was significant positive (r = 0.7235) correlation between the larval population of *M. vitrata* and the morning relative humidity, while the evening relative humidity was found negatively correlated but non-significant (r = -0.4055). As well the correlation between the larval population of *M. vitrata* and the rainfall was negative

Table 3. Multiple linear regression analysis of number of larvae of *M. vitrata* with biotic and abiotic factors during *rabi* 2007-08.

	Variable	Regression Coefficient (r)	Standard Error (B)	t - value
X_1	Maximum temperature (^{0}C)	1.2741	2.4599	0.5179
X_2	Minimum temperature (^{0}C)	-2.1435	1.6228	1.3208
X_3	Morning relative humidity (%)	2.6991*	0.3739	7.2181*
X_4	Evening relative humidity (%)	-0.5981	0.5886	1.0162
X_5	Rain fall (mm)	2.2260	2.1751	1.0233
X_6	Spiders	-2.3727	1.6016	1.4820
X_7	Coccinellids	3.2432	1.6999	1.9078

Intercept (a) = -183.422 * Significant at 5% level

Per cent of variation attributable to the Regression (R^2) = 0.9445

and non-significant (r = -0.1175). Arulmozhi (1990) and Lakshmi (2001) who also reported significant negative correlation (r = -0.7977) between the minimum temperature and the larval population of *M. vitrata* and a positive significant correlation (r = 0.4844) between the morning relative humidity and larval population of *M. vitrata.* The correlation between the larval population of *M. vitrata* and spiders was found positive but non-significant (r = 0.3396) and correlation between larval population and coccinellids was also positive and non-significant (r = 0.1901). The data on larval incidence were subjected to Multiple Linear Regression (MLR) analysis and the following equation was obtained

$$Y = -183.422 + 1.274 X_1 - 2.143 X_2 + 2.699^* X_3 - 0.598 X_4 + 2.226 X_5 + 3.243 X_6 - 2.372 X_7$$

Thus, it was observed that the coefficient of determination (R^2) for larval incidence was 0.9440 which showed that the biotic and abiotic factors together were able to cause the variation in larval incidence to the extent of 94.90 per cent. It was also observed from the multiple linear regression equation that among the biotic and abiotic factors studied, the partial regression co-efficient (b) for morning relative humidity was significant and positively correlated (b = 2.699) with larval incidence. Therefore, it was evident that every one per cent increase in morning relative humidity has lead to an increase of 2.69 in the larval population of *M. vitrata* (Table 3). These results are in agreement with the findings of Reddy *et al,* (2001) who reported that maximum, minimum temperatures and morning relative humidity show positive significant influence on the population of *M. vitrata.* Similarly, Sahoo and Behra (2001) reported a positive correlation between populations of *M. vitrata* and maximum and minimum temperatures on pigeonpea where as the relative humidity had positive effect on pod borer population. From the present study it was evident that the November sown blackgram has suffered heavily due to higher larval incidence at maximum flowering and podding stage. Earlier Lakshmi (2001) also revealed that November sown blackgram suffered heavily due to higher damage at flowering and podding stage. Since the correlation between the incidence of *M. vitrata* and minimum temperature was negative correlated, and with the morning relative humidity was positive the advanced sowing of blackgram may avoid the maximum population at flowering stage of the crop. Hence, the date of sowing may be advanced to avoid the incidence of *M. vitrata.*

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