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Population build-up and seasonal abundance of spotted pod borer, *Maruca vitrata* (Geyer) on pigeonpea (*Cajanus cajan* (L) Millsp.)

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ABSTRACT

The field experiment conducted at Regional Agricultural Research Station, Lam farm, Guntur during 2013-14 on pigeonpea (*Cajanus cajan* (L) Millsp) yielded a good amount of information on the trend of population build up and seasonal abundance of spotted pod borer, *M. vitrata*. The larval population/plant gradually increased from third week of November (47th standard week) and reached peak level (12.6 larvae/plant) at the third week of December (51st standard week), which coincides with the peak flowering stage of the crop. The pest remained active up to last week of January. Highly significant correlation was obtained between *M. vitrata* and minimum temperature, mean temperature and wind speed with correlation coefficient (r) being -0.759, -0.815 and -0.838, respectively**.** Moderately significant correlation was obtained between *M. vitrata* and sunshine hours and evening relative humidity (RH-II) with correlation coefficients (r) being 0.656 and -0.609, respectively.

1. INTRODUCTION

Pigeonpea (*Cajanus cajan* L) is a tropical grain legume mainly grown in India and ranks second in area and production and contribute about 90% in the world's pulse production 3.17 million tonnes and 817 kg ha-1 of productivity. In Andhra Pradesh, it is cultivated in an area of 5.09 lakh ha with 2.51 lakh tonnes of production and with productivity of 524 kg ha-1 [1]. Though the area under redgram is increasing both in Kharif and Rabi seasons, the yields have remained stagnant (500-700 kg/ha) for the past 3-4 decades, largely due to insect pest damage [2]. More than 300 species of insect species have been reported infesting the crop [3] of which legume pod borer, *Maruca vitrata* is a serious pest of pigeonpea in tropic and subtropics, because of its extensive host range, destructiveness and distribution on cowpea, mungbean, urdbean and field bean [4]. The infestation levels range from 9-51% [5], whereas 84 per cent pod borer damage in pigeonpea [6]. The annual loss was estimated to be US $ 30 million [7]. The larvae feed on flowers, buds and pods and the entrance hole is plugged with excreta. It is basically a hidden pest and completes its larval development inside the web formed by rolling and tying together leaves, flowers, buds and pods. This typical concealed feeding protects the larvae from natural enemies, human interventions or other adverse factors including insecticides [8]. Hence, it is very much essential to note down the population buildup so as to take up the management practices in time. Similarly, various weather parameters are known to influence the population build up and suppression. Hence, an attempt was made to know the influence of weather parameters on the population of *M. vitrata* for planning an effective pest management strategy that will help our farmers benefit financially without the risk of long term problem including resurgence.

2. MATERIALS AND METHODS

An experimental plot was selected for the studies on the population buildup and seasonal abundance of spotted pod borer, *M. vitrata* was carried out at Regional Agricultural Research Station, Lam farm, Guntur, Andhra Pradesh during 2013-14 with pigeonpea (cv. ICPL 85063). The crop was raised following all the package of practices recommended for the crop in this region and season and was kept completely under unprotected conditions. Observations on *M. vitrata* larvae were recorded at weekly intervals starting from flower initiation to maturity from 10 randomly selected plants from three locations in the plot. The trend of population build-up of the borer was determined by working out the mean number of larvae/plant. Simultaneously, weather parameters like maximum, minimum and mean temperatures, morning and evening relative humidity, sunshine hours, rainfall, rainy days, evaporation and wind speed collected from meteorological observatory, RARS, Lam were used for correlation and regression studies to know the influence of weather parameters on the population of *M. vitrata*.

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3. RESULTS AND DISCUSSION

The results indicated that the incidence *M. vitrata* commenced from the third week of November (47th standard week) and remained active up to last week of January. The pest reached its peak level (12.6 larvae per plant) at the third week of December (51st standard week), which coincides with the peak flowering stage of the crop (Table 1). The results obtained are in concurrence with the reports of [9], who found that the incidence of *M. vitrata* on pigeonpea was bimodal where early infestation starts from September reaching its first peak during middle October and second peak during December. The incidence of *M. vitrata* increased with the initiation of flowering, having the highest population at full podding stage of pigeonpea. [10] Correlation and regression studies conducted on larval population and different weather parameters showed that highly significant correlation was obtained between *M. vitrata* and minimum, mean temperatures and wind speed with correlation coefficient (r) being -0.759, -0.815 and -0.838, respectively**.** Moderately significant correlation was obtained between *M. vitrata* and sunshine hours and evening relative humidity (RH-II) with correlation coefficients (r) being 0.656 and -0.609, respectively (Table 2). The present findings are in conformity with findings of Arulmozhi (1990) [11], Lakshmi (2001) [12], and Sivaramakrishna et al. (2004) [13]. Positive correlation (r=0.86) between rainfall and incidence of *M. vitrata* has been reported by [9] Sharma *et al.*, (2000). The larval population of *M. vitrata* was significantly influenced by average temperature and relative humidity at Hisar [14]. The population buildup of *M. vitrata* varied remarkably in different parts of the country probably due to differences in agro climatic conditions and crop types [15]. The maximum, minimum and mean temperatures and relative humidity recorded at morning, evening and mean were found to be highly correlated with that of larval population of *M. obtusa*, *M. testulalis* and borer complex while *H. armigera* remained unaffected [16]. Morning and evening relative humidities showed significant positive correlation and minimum temperature showed significant negative correlation on the larval population of *M. vitrata* in rice fallow blackgram. On flower damage, only morning relative humidity showed significant positive correlation, while on pod damage, all weather factors showed non significant correlation in rice fallow blackgram [17]. From the present findings it can be inferred that there was only single peak without any multiple peaks or overlapping broods of *M. vitrata*. Hence the farmers can be alerted at third week of December where the pest reached the peak level to take up pest management practices at right time. Similarly, highly significant correlation was obtained between *M. vitrata* and minimum, mean temperatures and wind speed and moderately significant correlation was obtained between *M. vitrata* and sunshine hours and evening relative humidity (RH-II).

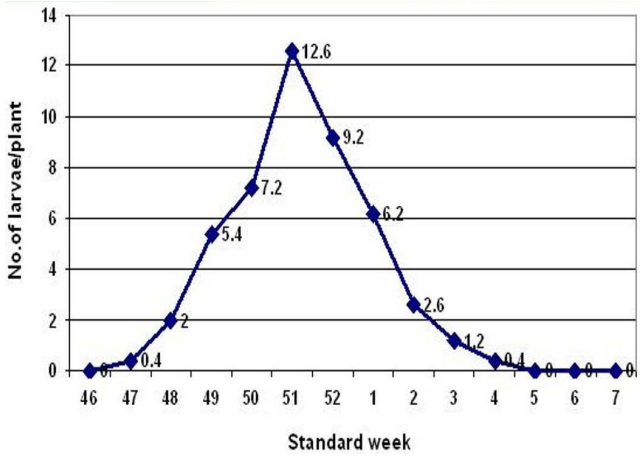

Fig. 1: incidence of maruca vitrata larvae/plant during 2013. 14 at RARS, lam. guntur

Table 1: Population buildup and seasonal incidence of *Maruca vitrata* on Pigeonpea.

WEEK NO.	PERIOD	TEMP.(°C)		R.H. (%)		SUN-SHINE (hrs.)	WIND SPEED (km/hr)	MEAN TEMP. (°C)	RAIN-FALL (mm)	RAINY DAYS	EVAPO-RATION (mm)	*M. vitrata* Larvae/ plant (no.)
		MAX.	MIN.	I	II							
46	12-18 NOV	30.5	19.4	90	51	6.4	0.0	2.3	25.0	0	3.6	0.0
47	19-25	29.5	21.5	90	72	3.5	29.0	3.5	25.5	2	3.9	0.4
48	26-02 DEC, 2013	29.3	21.2	98	70	4.5	11.4	2.7	25.2	1	2.7	2.0
49	03-09	29.4	18.3	92	48	5.6	0.0	2.5	23.9	0	3.4	5.4
50	10-16	30.4	16.4	86	51	5.6	0.0	2.7	23.4	0	4.6	7.2
51	17-23	29.3	15.2	94	51	8.1	0.0	1.7	22.3	0	3.1	12.6
52	24-31	28.9	16.4	93	49	6.4	0.0	2.5	22.6	0	3.2	9.2
1	01-07 JAN,2014	29.9	16.3	97	55	6.4	0.0	2.4	23.1	0	3.1	6.2
2	08-14	30.3	17.4	99	58	6.2	0.0	2.6	23.8	0	3.1	2.6
3	15-21	30.2	18.2	97	56	7.2	0.0	3.6	24.2	0	3.4	1.2
4	22-28	29.4	17.9	97	53	5.0	0.0	3.0	23.6	0	3.3	0.4
5	29-04 FEB,2014	30.1	17.5	99	50	4.8	0.0	2.8	23.8	0	3.1	0.0

Table 2: Correlation and regression studies between weather parameters and *Maruca vitrata* incidence.

Weather parameters	Correlation coefficient	R^2
Max T (^oC)	-0.250	0.063
Min T (^oC)	**-0.759 ****	**0.576**
Mean Temp. (^oC)	**-0.815 ****	**0.665**
RH-I (%)	-0.321	0.103
RH-II (%)	**-0.609 ***	**0.371**
RF (mm)	-0.445	0.198
Rainy days	-0.454	0.206
Sunshine (hrs)	**0.656 ***	**0.431**
Wind speed (km/hr)	**-0.838 ****	**0.703**
Evaporation (mm)	0.004	0.0

*Significant at 5% level ** Significant at 1% level

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