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EFFECT OF DIFFERENT WEATHER PARAMETERS ON POPULATION OF STEM BORER, *CHILO PARTELLUS* SWINHOE INFESTING *RABI* SORGHUM

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ABSTRACT

Studies on population dynamics of *Chilo partellus* Swinhoe infesting sorghum was made during 2006-07 and 2007-08 in *rabi* season at Agricultural Research Station, N.A.U., Tanchha, dist. Bharuch. The incidence of pest began from fourth week of November and continued up to first week of February with a peak activity in second and fourth weeks of December. The abiotic factors, maximum, minimum and average temperature had significant negative association, while humidity, rainfall, rainy days and sunshine hours, wind velocity and evaporation had no significant influence on *C. partellus* on *rabi* sorghum.

Key words: sorghum, stem borer, larvae, correlation, weather parameters

INTRODUCTION

The sorghum stem borer, *Chilo partellus* Swinhoe, a major pest of sorghum, inflicts heavy loss of 25 to 83.7 per cent (Jotwani *et al*, 1971) and is more prevalent in southern States of India (Jotwani, 1980). The seasonal abundance of the stem borer using light trap was studied by earlier workers, but influence of weather factors on population fluctuation of *Chilo partellus* is scanty. Hence, the present investigation was carried out with a view to develop a forecasting model for the pest incidence and incorporate the same in integrated pest management programme gainfully.

MATERIALS AND METHODS

The study on population fluctuation of stem borer and correlation with weather parameters was carried out for two consecutive years (*rabi* 2006-07 and 2007-08) on sorghum variety GJ 38. In order to determine the effect of weather parameters on population fluctuations of stem borer, the crop was grown in 400 m^2 area during the two *rabi* seasons at Agricultural Research Station, N.A.U., Tanchha. All the recommended agronomic practices were followed for raising the crop. Experimental area was kept free from insecticidal spray throughout the season. In order to record the population of stem borer the crop area was divided into 20 spots and 5 plants were randomly selected from each spot. Observation on the population fluctuation of stem borer was carried out by recording number of larvae present on randomly selected 100 plants from the plot of 20 x 20 m. area at weekly intervals throughout the growing season. The selected plants were split-open for counting the larvae of stem borer and their relative abundance was calculated. In order to study the effect of weather parameters *viz*., maximum temperature, minimum temperature, average temperature, morning relative humidity, evening relative humidity, average relative humidity, sunshine hours, rainy days and rainfall on population of the stem borer, coefficient of correlation and simple/ multiple regressions were worked out.

RESULTS AND DISCUSSION

During *rabi* 2006-07, the stem borer, *Chilo partellus* Swinhoe incidence on sorghum commenced from 48th standard week (last week of November) with 0.1 larvae/plant and reached to a peak level (0.24 larvae/plant) on 50th standard week (second week of December); thereafter, there was a gradual decline in the larval population and the minimum was recorded on 5th and 6th standard week (last week of January and first week of February), at the time of crop harvest (Table 1).

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Table 1. Population of *Chilo partellus* Swinhoe on *rabi* sorghum variety GJ 38

S.No.	SMW	WAS	Stem borer larval population per plant		
			2006-07	2007-08	Pooled
1.	45	2	0	0	0
2.	46	3	0	0	0
3.	47	4	0	0	0
4.	48	5	0.1	0.01	0.06
5.	49	6	0.09	0.03	0.06
6.	50	7	0.24	0.06	0.15
7.	51	8	0.16	0.08	0.12
8.	52	9	0.19	0.11	0.15
9.	1	10	0.09	0.11	0.10
10.	2	11	0.05	0.13	0.09
11.	3	12	0.06	0.18	0.12
12.	4	13	0.05	0.12	0.09
13.	5	14	0.04	0.11	0.08
14.	6	15	0.04	0.08	0.06

SMW = Standard meteorological week; WAS = Week after sowing

Table 2. Coefficient of correlation values between *C. partellus* and weather parameters during the two *rabi* seasons

Year	Weather parameters								
	Temperature (°C)			Relative Humidity (%)			Sunshine hours	Wind velocity	Evaporation
	Max.	Min.	Mean	Morn.	Even.	Mean			
2006-07	-0.342	-0.466	-0.440	-0.122	-0.192	-0.175	0.378	-0.018	-0.303
2007-08	-0.683*	-0.619*	-0.673*	0.234	0.173	0.223	0.339	0.603	0.235
Pooled	-0.463*	-0.479*	-0.490*	0.077	0.015	0.055	0.329	0.283	-0.080

* Value of "t" significant at 5% level of significance

In the subsequent year, during *rabi* 2007-08, *C. partellus* was observed again from 48th standard week with 0.01 larvae per plant that gradually increased and reached a peak level (0.18 larvae/plant) during 3rd standard week (third week of January), thereafter declined at harvest.

A perusal of the pooled data (2006-07 and 2007-08) showed that incidence of this pest (Table 1 and Figure 1) on crop commenced during last week of November (48th standard week) that remained till crop harvest. During this period, population showed fluctuation exhibiting three peaks of its activity. The pest commenced (0.06 larvae/plant) in the last week of November, which increased and attained its first peak (0.15 larvae/plant) in second week of December. Next week it decreased, again showed second peak in last week of December. Then gradually decreased till second week of January, it once again increased in the third week of January (0.12 larvae/plant), the population thereafter gradually decreased at harvest.

Correlation with weather parameters

From the Table (2) and Figure (1) it can be seen that a negative and significant correlation was observed between stem borer population and maximum temperature, minimum temperature and average temperature indicating that when these climatic factors increased, the pest population decreased significantly and vice versa. The correlations between stem borer and morning relative humidity, evening relative humidity, average relative humidity, sunshine, wind velocity and evaporation were not significant indicating no significant influence of these weather factors. The regression equation was worked out by taking stem borer population (Y) as a dependent variable and meteorological parameters as independent variables. The following equation was arrived at:

Y= 0.313+0.0018 max-temp. - 0.0001 min-temp. - 0.0129 av. temp. (R^2=0.2409)

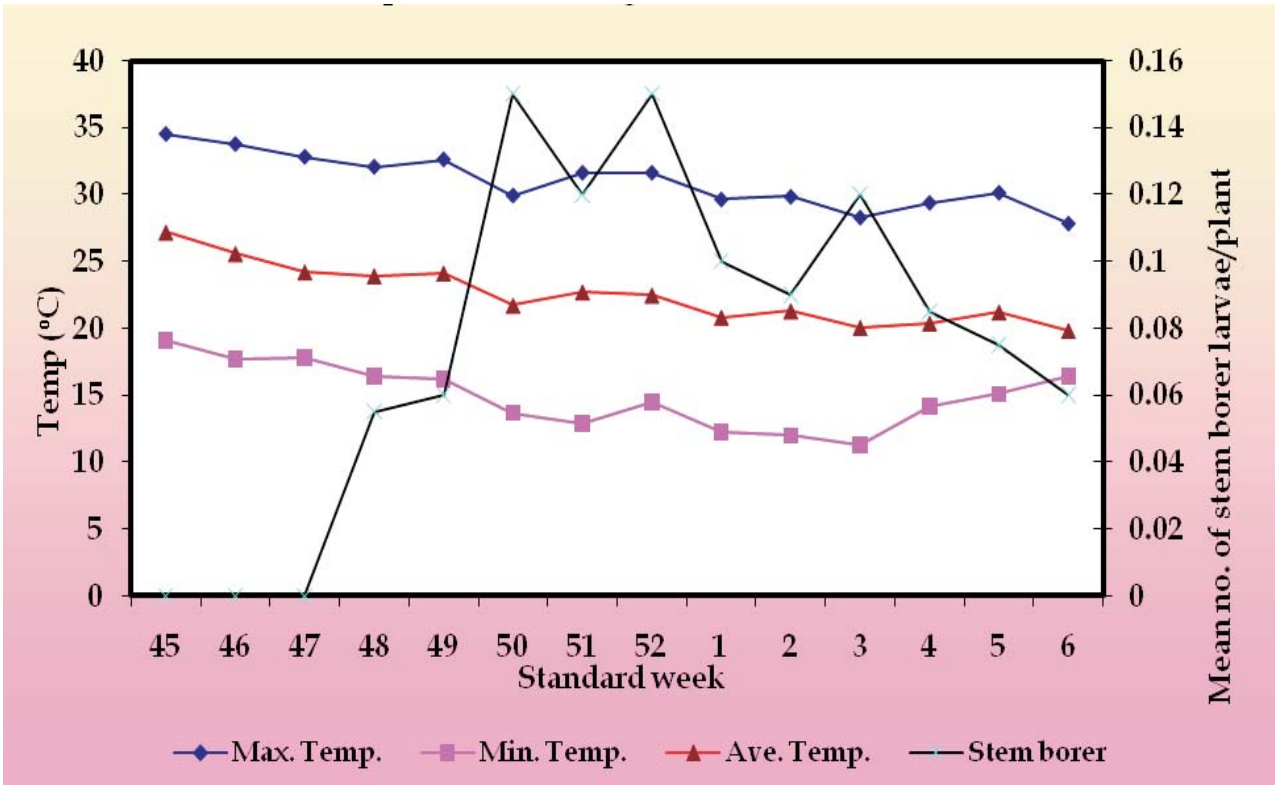


Fig. 1. Correlation of stem borer on sorghum in relation to weather parameters during *rabi* season

The multiple regression coefficient of determination value (R^2) was 0.2409 which explains that there was 24.09 per cent variation in dependent variable (Y) due to various independent variables. Thus, the present study clearly indicates that temperature alone significantly influenced the population of *C. partellus*; while, the other weather factors had no significant influence on population of stem borer during *rabi* season.

Earlier, Kandalkar *et al.* (2002) reported that minimum temperature showed significant negative correlation with stem borer leaf injury and also stated that the maximum temperature, morning relative humidity, evening relative humidity and rainfall did not influence stem borer incidence significantly. Similar observations were reported by Kandalkar and Men (2004), wherein they reported that the minimum temperature showed a significant negative correlation with stem borer incidence.

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