Effect of Different Weather Parameters on Population of Stem Borer, *Chilo partellus* Swinhoe infesting *Rabi* Sorghum

D. R. Patel[1] and M. S. Purohit[2]

Department of Entomology, N.M. College of Agriculture, Navsari Agricultural University, Navsari, Gujrat (396 450), India

Corresponding Author

D. R. Patel
e-mail: patel.devendra2829@yahoo.com

Article History

Article ID: IJEP89
Received in 5th August, 2015
Received in revised form 24th November, 2015
Accepted in final form 11th December, 2015

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 begins from fourth week of November(0.06 larva plant $^{-1}$) and continued up to first week of February with a peak activity in second and fourth week of December(0.15 larva plant $^{-1}$). 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 association with *C partellus* on *rabi* sorghum.

Keywords: sorghum, stem borer, larvae, correlation, weather parameters

1. Introduction

The sorghum stem borer, *Chilo partellus* Swinhoe, a major pest of sorghum, inflicts heavy loss of 25 to 83.7% (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 which also helps in forecasting the pest incidence and to incorporate the same in integrated pest management programme gainfully.

2. 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 sorghum crop (variety GJ 38) was grown in 400 m^2 areas during *rabi* seasons at Agricultural Research Station, N.A.U., Tanchha, Gujrat. 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 population fluctuation of stem borer was carried out by recording number of larvae present on randomly selected 100 plants from the plot of 20×20 m^2. area at weekly interval throughout the growing season. The plant selected was dissected for 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 various insect pests, correlation coefficient and multiple/simple regression were worked out.

3. Results and Discussion

During *rabi* 2006-07 *Chilo partellus* incidence (Table 1) on sorghum crop commenced with 0.1 larva plant^{-1} from 48th standard week (last week of November) and reached to a peak level (0.24 larva plant $^{-1}$) on 50th standard week (second week of December). Then gradually decline the larval population and found minimum on 5th and 6th standard week (last week of January and first week of February) i.e. at the time of harvesting.During *rabi* 2007-08, *C. partellus* commenced with 0.01 larvae per plant from 48th standard week and gradually increased and reached a peak level (0.18 larva plant $^{-1}$) during 3rd standard week (third week of January) and then decline till harvesting of crop.

A close perusal of 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

Table 1 : Population of Stem borer, *C. partellus* on sorghum variety GJ 38 during *rabi* season

S r . No.	MW	Date	WAS	Stem borer larval population plant^{-1}		
				2006-07	2007-08	Pooled
1.	45	5-11 Nov	2	0.00	0.00	0.00
2.	46	12-18	3	0.00	0.00	0.00
3.	47	19-25	4	0.00	0.00	0.00
4.	48	26-2	5	0.10	0.01	0.06
5.	49	3-9 Dec	6	0.09	0.03	0.06
6.	50	10-16	7	0.24	0.06	0.15
7.	51	17-23	8	0.16	0.08	0.12
8.	52	24-31	9	0.19	0.11	0.15
9.	1	1-7 Jan	10	0.09	0.11	0.10
10.	2	8-14	11	0.05	0.13	0.09
11.	3	15-21	12	0.06	0.18	0.12
12.	4	22-28	13	0.05	0.12	0.09
13.	5	29-4	14	0.04	0.11	0.08
14.	6	5-11 Feb	15	0.04	0.08	0.06

MW: Standard meteorological week; WAS: Week after sowing

standard week) and remained till harvesting of crop. During this period population showed fluctuation exhibiting three peaks of its activity. The pest commenced (0.06 larva plant^{-1}) in last week of November, which increased and attained its first peak (0.15 larva plant $^{-1}$) 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 surprisingly increased in third week of January (0.12 larva plant $^{-1}$), the population then gradually decreased up to end of season.

3.1. Correlation with weather parameters

From the Table 2 and Figure 1 it can be seen that the negative and significant correlation were observed between stem borer population and maximum temperature, minimum temperature and average temperature indicating that

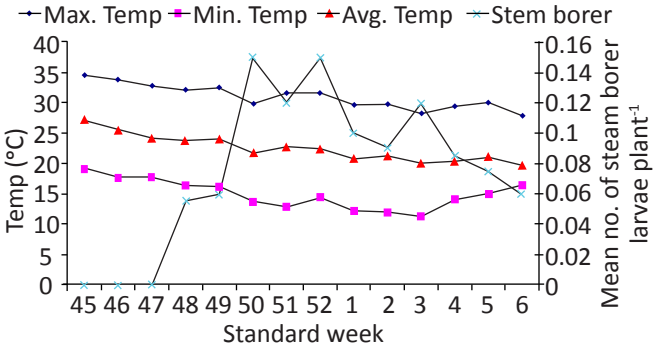

Figure 1: Correlation of stem borer on sorghum in relation to weather parameters during *rabi* season

when these climatic factors increased, the pest population decreased significantly and vice versa. The correlation between stem borer and morning relative humidity, evening relative humidity, average relative humidity, sunshine hour, wind velocity and evaporation were found non significant indicating there was no correlation between this 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 fitted.

Y= 0.3126 + 0.0018 max temperature - 0.0001 min temperature -0.0129 avg temperature (R^2=0.2409)

The multiple regression coefficients (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 the temperature influence on population flutuation of *C. partellus.* While other weather factors had no or less influence on population of stem borer during *rabi* season. Kandalkar *et al.* (2002) reported that minimum temperature showed significant and negative correlation with stem borer leaf injury They also stated that the maximum temperature, morning relative humidity, evening relative humidity and rainfall did not influence stem borer incidence significantly. The results are in close confirmation of the result obtained through present investigation. The similar observation were reported by Kandalkar and Men (2004), they reported that the minimum temperature showed a significant

Table 2: Correlation coefficient between *C. partellus* and weather parameter during *rabi* season

Year	Weather parameter						Sunshine hours	Wind velocity	Evapora-tion
	Temperature °C			Humidity %					
	Max.	Min.	Mean	Morning	Evening	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

*Significant at (p=0.05) level

negative correlation with stem borer incidence.

4. Conclusion

The incidence of stem borer, *C. partellus* begins from fourth week of November and continued up to first week of February with a peak activity in second and fourth week 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 association with *C partellus* on *rabi* sorghum

5. References

Jotwani, M.G., 1980. Prevention and control of insect pests in *jowar* in *Jowar.* Low Priced Book Series, No.66, ICAR., New Delhi, 30−38.

Jotwani, M. G., Chandra, D., Young, W.R., Sukhani, T.R., Saxena, P.N., 1971. Estimation of avoidable losses caused by the insect complex on sorghum hybrid CSH-1 and percentage increase in yield over untreated control. International Journal of Entomology 33(4), 375−383.

Kandalkar, H.G., Men, V.B., Atale, S.B., Kadam, P.S., 2002. Effect of meteorological factors on incidence of sorghum stem borer, *Chilo partellus* Swinhoe. Journal of Applied Zoological Researches 13(1), 69−70.

Kandalkar, H.G., Men, V.B., 2004. Path co-efficient analysis of sorghum *Chilo partellus* (Swinhoe) (Lepidoptera: Pyralidae) incidence vs. abiotic factors. Insect Enviroment, 10(1), 19−20.