
STUDIES ON PARASITES OF STEM BORER, *Chilo partellus* ON KHARIF SORGHUM

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ABSTRACT

During *kharif* season *Apantales* was active from third week of August to first week of November with maximum parasitism in last week of September (17.26 %), while stem borer was parasitized by techinid fly from third week of August and remain till harvesting of crop. The maximum activity of techinid fly was in the month of September (9.90 %) there after its activity decline till harvesting. Significant negative correlation of *Apantales* and techinid fly with wind velocity was observed, while correlation with other weather factors was found non-significant.

INTRODUCTION

In all the regions of the world where sorghum is cultivated, this graminaceous crop is attacked by lepidopterous stem borers. Many parasites of different families have been recorded in Asia, Africa, and the Americas from the five main sorghum stem borers: *C. partellus*, *B. fusca*, *Sesamia* spp., *E. saccharina*, and *D. saccharalis*. Three families of larval parasites predominate: Braconidae, Ichneumonidae, and Tachinidae. Braconidae account for 35% of parasites recorded on *C. partellus* (Betbeder, 1989). Biological control of sorghum stem borers has often been considered to be part of a strategy for graminaceous crop protection in tropical countries. So it is needed to study the presence of parasites in *kharif* sorghum in area of South Gujarat.

MATERIALS AND METHODS

The present investigation was carried out at Agricultural Research Station, Navsari Agricultural University, Tanchha, Dist-Bharuch to study the abundance of parasites of stem borer and its relation to weather parameter during *Kharif* 2007-08 and 2008-09. Third instars and older instars larvae collected from field during different week were held in plastic tubes (5 cm x 3.5 cm) and reared on sorghum stem. The tubes were then observed for the emergence of parasites/adult. The data were correlated with abiotic factors.

RESULTS AND DISCUSSION

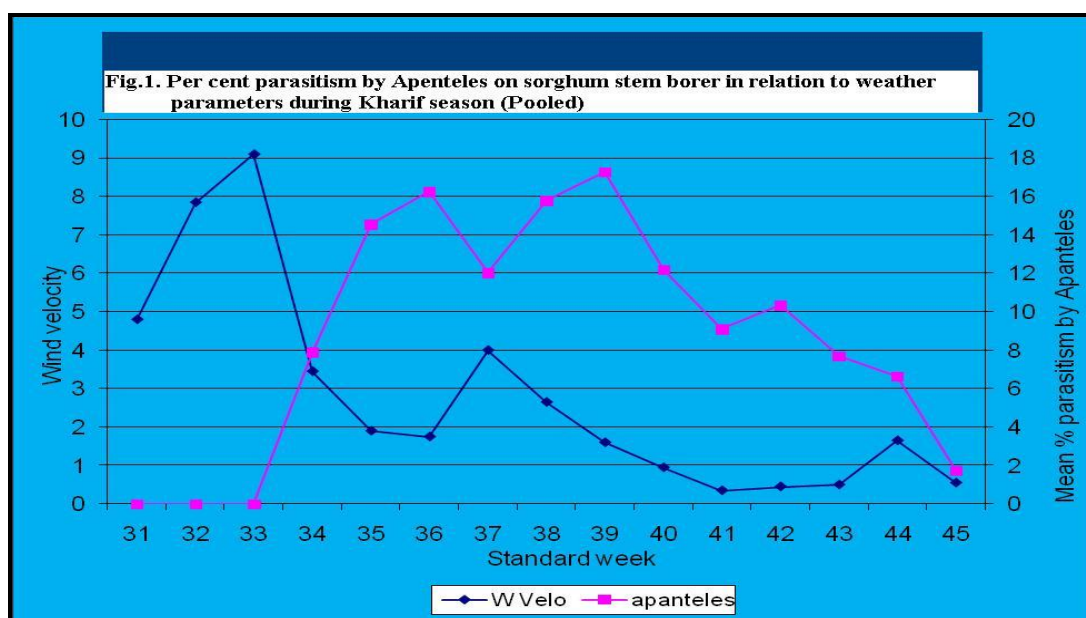
Apanteles

During *kharif* 2007-08 *Chilo partellus* was parasitized by *Apanteles* from third week of August to last week of October ranging between 4.00 to 16.67 per cent (Table 1). Maximum parasitism (16.67 %) was observed on 39th standard week (last week of September). During 2008-09 *C. partellus* was parasitized by *Apanteles* from third week of August to first week of November ranging between 6.90 to 18.52 per cent (Table 1). Maximum parasitism (18.52 %) was observed on 38th standard week (third week of September). Pooled data of both the season revealed that parasite was active from third week of August to first week of November. During this period parasite population showed fluctuating exhibiting three peaks of its activity, first peak in first week of September (16.23 %), second in last week of September (17.26 %) and third in third week of October (10.33 %), then parasitic activity decline till harvesting of crop (Table 1). Results of correlation coefficient of parasites of sorghum stem borer with weather parameters (Table 2) revealed significant negative correlation of parasite with wind velocity indicated increase wind velocity parasite population decreased and vice versa, while correlation with other weather factors were non-significant indicated there was no correlation between them.

The regression equation was worked out by taking *Apanteles* population (Y) as a dependent variable and meteorological parameters as independent variables. The following equation was fitted.

$$Y = 11.7912 - 1.0529 \text{ WV} (R^2 = 0.2146)$$

The multiple regression coefficients (R^2) were 0.2146 which explains that there was 21.46 per cent variation (Y) due to various independent variables.



Nirmala and Raj (1996) reported the larvae of *C. partellus* infesting maize were found to be parasitized by *Apanteles* sp. during September. According to Mohan *et al.* (1991) the

parasitoids were most active from the third week of August to the last week September. Panwar and Sarup (1979) reported *Apanteles flavipes* was the most dominant parasite causing 42.8 per cent parasitism during second fortnight of September. Kulkarni and Bhati (1982) reported that very high amount of larval parasitization by *Apanteles flavipes* during the first week of September. Thus, present findings were close agreement with earlier findings.

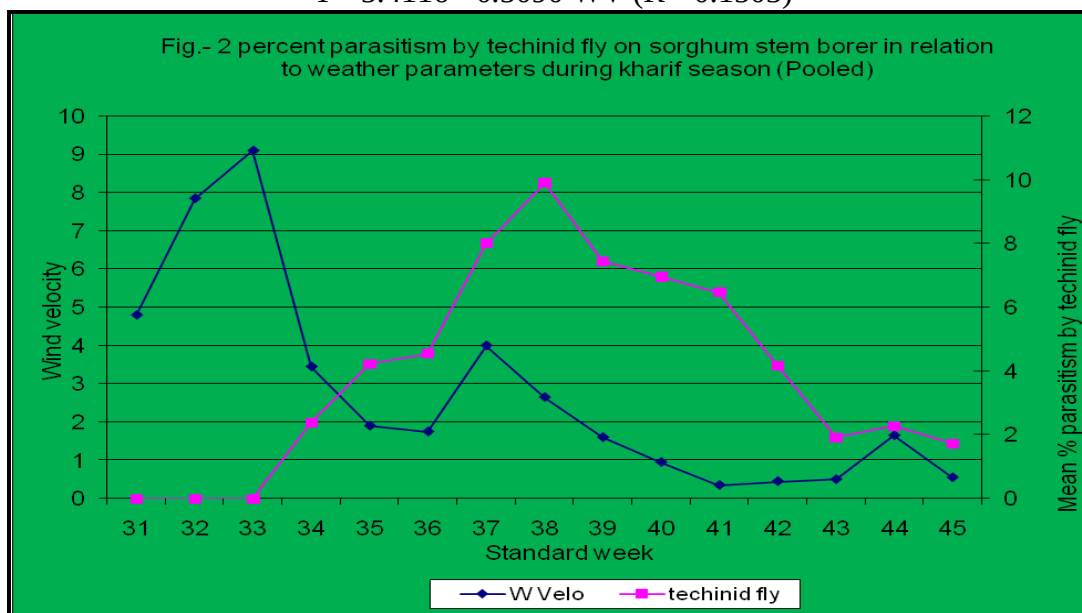
Techinid fly

During *kharif* 2007-08, stem borer was parasitized by techinid fly from fourth week of August to second week of October ranging between 3.57 to 8.70 per cent. Maximum parasitism (8.70 %) was observed on 38th standard week (third week of September). In *kharif* 2008-09, parasitism of *C. partellus* commenced from 34th standard week and ranging between 3.45 to 11.11 per cent (Table 1). Maximum parasitism (11.11 %) was observed on 38th standard week (third week of September). The pooled data of both the seasons indicated that the parasite (Table 1) was active from third week of August and remain till harvesting of crop. The result also revealed that maximum activity of this parasite was in the month of September (9.90 %), there after its activity decline till harvesting.

Correlation between per cent parasitism by techinid fly and wind velocity was negative and significant, which indicated that as wind velocity increased per cent parasitism decreased and vice versa, while the correlation with other meteorological factors was non-significant indicated there was no correlation between them (Table 2).

A step wise regression analysis was worked out considering weather parameters which had significant correlation with the population of the parasite. The regression equation fitted to the data taking the parasite (Y) as a dependent variable and meteorological parameters as independent variables. The following equation was fitted in *kharif* season.

$$Y = 5.4116 - 0.5090 \text{ WV } (R^2 = 0.1503)$$



The coefficient of determination (R^2) was 0.1503 indicating that as much as 15.03 % variation in parasite population can be predicted by the equation due to the effect of weather parameter.

CONCLUSION

From the present investigation, it can be concluded that during *kharif* season *Apanteles* was active from third week of August to first week of November with maximum parasitism in last week of September (17.26 %), while stem borer was parasitized by techinid fly from third week of August and remain till harvesting of crop with maximum parasitism in the month of September (9.90 %). Significant negative correlation of *Apanteles* and techinid fly with wind velocity was observed, while correlation with other weather factors was found non-significant.

REFERENCES

- Betbeder, M. (1989). Biological control of sorghum stem borer. International workshop on sorghum stem borer, 17-20 Nov.1987, ICRISAT Centre, India, pp. 89-93.
- Kulkarni, K. A. and Bhuti, S. G. (1982). Incidence of *Apanteles flavipes* from the sorghum stem borer *Chilo partellus* Swinhoe. *Sorghum News Letter*, **25:71**.
- Mohan, B. R., Verma, A. N. and Singh, P. P. (1991). Periodic parasitism of *Chilo partellus* (swinhoe) larvae of forage sorghum in Haryana. *J. Insect Sci.* **4(2)**: 167-169.
- Nirmala Devi and Desh Raj (1996). Extent of parasitization of *Chilo partellus* (Swinhoe) on maize by *Apanteles* sp. In mid hill zone of Himachal Pradesh (India).*J. Ent. Res.*, **20(2)**:171-172.
- Panwar, V. P. S. and Sarup, P. (1979). Relation between successive date of sowing of maize and damage caused by *Chilo partellus* (Swinhoe) affecting grain yield. *J. Ent. Res.*, **3(1)**:9-24.

Table 1: Percentage parasitism by *Apanteles* and techinid fly on stem borer larvae during *kharif* season

Sr. No	M W	Date	WAS	Mean Per Cent Parasitism by <i>Apanteles</i>			Mean Per Cent Parasitism by Techinid fly		
				2007-08	2008-09	Pooled	2007-08	2008-09	Pooled
1	31	30-5 July	2	0	0	0	0	0	0
2	32	6-12 Aug	3	0	0	0	0	0	0
3	33	13-19	4	0	0	0	0	0	0
4	34	20-26	5	6.25	9.52	7.89	0	4.76	2.38
5	35	27-2	6	14.29	14.81	14.55	4.76	3.70	4.23
6	36	3-9 Sep	7	14.29	18.18	16.23	0.00	9.09	4.55
7	37	10-16	8	12.50	11.54	12.02	8.33	7.69	8.01
8	38	17-23	9	13.04	18.52	15.78	8.70	11.11	9.90
9	39	24-30	10	16.67	17.86	17.26	4.17	10.71	7.44
10	40	1-7 Oct	11	7.14	17.24	12.19	3.57	10.34	6.96
11	41	8-14	12	0.00	18.18	9.09	3.85	9.09	6.47
12	42	15-21	13	4.00	16.67	10.33	0.00	8.33	4.17
13	43	22-28	14	7.69	7.69	7.69	0.00	3.85	1.92
14	44	29-4	15	4.17	9.09	6.63	0.00	4.55	2.27
15	45	5-11 Nov	16	0.00	6.90	3.45	0.00	3.45	1.72

Table 2: Correlation coefficient of parasites of sorghum stem borer with weather parameters for *kharif* season

Sr. No	Weather Parameter	Mean Per Cent Parasitism by <i>Apanteles</i>			Mean Per Cent Parasitism by Techinid fly		
		2007-08	2008-09	Pooled	2007-08	2008-09	Pooled
1	Maximum Temp.(MaxT)	-0.257	0.480	0.151	-0.058	0.417	0.175
2	Minimum Temp.(MinT)	0.283	0.042	0.113	0.238	0.050	0.109
3	Mean Temp.(MinT)	0.156	0.413	0.251	0.543*	0.370	0.269
4	Morning relative humidity(MRH)	0.309	-0.093	0.084	0.304	-0.027	0.096
5	Evening relative humidity(ERH)	0.258	-0.236	-0.026	0.164	-0.148	-0.039
6	Mean relative humidity (ARH)	0.282	-0.182	0.017	0.222	-0.102	0.013
7	Rainfall	0.632*	-0.451	-0.012	0.299	-0.383	-0.103
8	Rainy days	0.210	-0.407	-0.118	0.115	-0.298	-0.110
9	Bright Sunshine hour(BSS)	-0.110	0.430	0.161	-0.071	0.325	0.113
10	Wind velocity(WV)	-0.300	-0.640*	-0.463*	-0.174	-0.555*	-0.387*
11	Evoporation	-0.210	0.134	-0.069	-0.024	0.090	-0.004

* Significant at 5 % level

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