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Studies on seasonal incidence of sorghum shoot fly, (*Atherigona soccata* Rondani)

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A field experiment was conducted during rabi cropping season of 2001-02 to characterize relationship of various meteorological parameters with sorghum shoot fly incidence. The serial sowing technique was used starting from 36th meteorological week to 44th meteorological week. Maximum per cent dead hearts on 14 days after emergence were recorded during 36th meteorological week (45%) when prevailing maximum, minimum temperature and morning and evening relative humidity were 33.1°C,22.1°C, 77.5 and 58.5%, respectively. Maximum per cent dead hearts on 28 days after emergence were recorded during 36th meteorological week (78.8%) when prevailing maximum, minimum temperature and morning and evening relative humidity were 32.7°C,22.1°C, 78.7 and 54.7%, respectively. The shoot fly incidence in the form of dead hearts was correlated with the meteorological parameters corresponding to the period of observations. The population dynamics showed significant positive correlation with meteorological parameters studied while dead hearts formation was not correlated.

Key wards : Shoot fly, *Atherigona soccata,* Sorghum

INTRODUCTION

Sorghum (*Sorghum bicolor* L. Monech) is one of the major food and fodder crop of Asia. It is an important cereal crop in India. It is the fourth most important cereal following rice, wheat and maize. It is the staple food in the semiarid parts of the world and well recognized for its draught resistance and is most suitable for dry regions. India is the major sorghum growing country in the world contributing 34% of the semi arid tropical sorghum (Shivkumar and Virmani 1982). It ranks first in acerage and second in production next to USA. The sorghum shoot fly, (*Atherigona varia soccata* Rondani) an Anthomycid fly, in the family Muscidae, order Diptera is the primary pest of economic importance of sorghum. The incidence of the shoot fly is known to vary from region to region and season to season.

MATERIALS AND METHODS

The experiment was conducted during the rabi season of 2001-2002 at Sorghum Research Station, M.A.U., Parbhani ($19^0\ 16^1$N; $76^0\ 47^1$E with an altitude of 408.50 m above MSL). *It consists of nine serial sowing dates as treatments* - S_1 3rd September, 2001; S_2 10th September, 2001; S_3 17th September, 2001; S_4 24th September, 2001; S_5 1st October, 2001; S_6 8th October, 2001; S_7 15th October, 2001; S_8 22nd October, 2001 and S_9 29th October, 2001.

The cultivar CSH-13-R was sown in a uniform, leveled and well drained field. The soil was typical medium black cotton having 8.02 pH, with medium depth. The gross plot size was 6.5m x 3.25m and net plot size was 5.00 x 2.25m. A plant spacing of 45cm x 15cm was maintained. Cultural operations were carried out as per recommended practice. Thinning as well as gap filling was carried out 3 days after germination and a single healthy seedling per hill was kept. Observations on dead hearts were recorded on 14th and 28th day after emergence. The plants showing dead hearts were recorded and then removed to avoid recounting. The observations on meteorological parameters obtained from Agro-meteorological observatory situated at SRS, MAU, Parbhani.

RESULTS AND DISCUSSION

Meteorological conditions during the period of observations i.e. on 14 days after emergence :

The meteorological data shows that, the mean maximum temperature (max.T.) during the experimental period was 32.2°C and varied between 30.8-33.1°c.Whereas, the mean minimum temperature (min.T.) was 18.9°C and varied between 14.1-22.2°C.The mean morning relative humidity (RH-I) was 76.0% with a range from 67.5-85.0% and the mean afternoon relative humidity (RH-II) was 47.3% with a range from 34.5-58.5% (Table 1). The mean rainfall intensity during the experimental period was 46.5 mm which fluctuates between 11.2-190.7 mm.

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Table 1 : Population dynamics during the season (14 DAE).

S. No.	Met. week	Date of sowing	Period of observation	Weather parameters corresponding to the period of observation					Percent dead hearts on 14 DAE
				Temp. (^{0}C)		RH (%)		Rainfall (mm)	
				Max.	Min.	AM	PM		
1	36	Sept.,3, 2001	Sept. 10- Sept. 23, 2001	33.1	22.1	77.5	58.5	11.2	45.0
2	37	Sept.,10, 2001	Sept. 17- Sept. 30, 2001	32.7	21.7	79.0	57.0	18.8	38.4
3	38	Sept.,17, 2001	Sept. 24- Oct.7, 2001	32.4	22.2	80.0	51.0	168.8	15.1
4	39	Sept.,24, 2001	Oct. 1- Oct. 14, 2001	30.8	22.2	85.0	55.2	190.7	11.4
5	40	Oct.,1, 2001	Oct. 8- Oct. 21, 2001	31.7	20.9	82.0	56.0	29.5	36.0
6	41	Oct.,8, 2001	Oct. 15- Oct. 28, 2001	32.4	17.5	72.5	43.5	0.0	12.8
7	42	Oct.,15, 2001	Oct. 22- Nov.4, 2001	32.7	14.1	71.0	34.5	0.0	13.4
8	43	Oct.,22, 2001	Oct. 29- Nov.11, 2001	32.5	14.8	69.5	34.5	0.0	29.6
9	44	Oct..,29, 2001	Nov. 5- Nov. 18, 2001.	32.0	14.9	67.5	36.0	0.0	27.5

Table 2 : Population dynamics during the season (28 DAE).

S. No.	Met. week	Date of sowing	Period of observation	Weather parameters corresponding to the period of observation					Percent dead hearts on 28 DAE
				Temp. (^{0}C)		RH (%)		Rainfall (mm)	
				Max.	Min.	AM	PM		
1	36	Sept.,3,2001	Sept.10-Oct.7,2001	32.7	22.1	78.7	54.7	90.0	78.8
2	37	Sept.,10,2001	Sept.17- Oct.14,2001	32.3	21.9	82.0	56.2	104.7	67.2
3	38	Sept.,17,2001	Sept.24-Oct.21,2001	32.0	21.5	81.0	53.5	99.1	42.5
4	39	Sept.,24,2001	Oct.1-28,2001	31.6	19.6	78.7	49.5	95.3	42.8
5	40	Oct.,1,2001	Oct.8- Nov.4,2001	32.2	17.5	76.5	45.2	14.7	62.5
6	41	Oct.,8,2001	Oct.15-Nov.11,2001	32.4	15.9	71.0	39.0	0.0	61.9
7	42	Oct.,15,2001	Oct.22-Nov.18,2001	32.3	14.2	69.5	34.7	0.0	60.8
8	43	Oct.,22,2001	Oct.29-Nov.25,2001	31.8	13.0	69.0	32.2	0.0	43.3
9	44	Oct..,29,2001	Nov.5- Dec.2,2001.	31.2	13.5	67.0	33.7	0.0	44.9

Meteorological conditions during the period of observations i.e. on 28 days after emergence :

The meteorological data show that, the mean maximum temperature (max.T.) during the experimental period was 32.0°C and varied between 31.2-32.7°C. Whereas, the mean minimum temperature (min.T.) was 17.6°C and varied between 13.0-22.1°C.The mean morning relative humidity (RH-I) was 74.8% with a range from 67.0-82.0% and the mean afternoon relative humidity (RH-II) was 44.3% with a range from 32.2-56.2%. The mean rainfall intensity during the experimental period was 44.8 mm which fluctuates between 14.7-104.7 mm. (Table 2).

The meteorological parameters were correlated with the dead heart percentage on 14 and 28 days after emergence.

Effects of weather parameters on dead hearts formation.

I-On 14 days after emergence:

To study the population dynamics of sorghum shoot fly, *Atherigona soccata* nine consecutive sowings were done starting from 36th meteorological week upto 44th meteorological week. Weekly observations on per cent

Table 3 : Studies on simple correlation (14 and 28 days after emergence).

Y/ai	14th DAE			28th DAE		
	a	b	r	a	B	r
Temp.max.	-28.71	1.140	0.923*	-100.10	2.080	0.905*
Temp.min.	-31.92	3.030	0.850*	3.22	1.190	0.872*
RH AM	107.50	-2.540	-0.136	-42.08	3.060	0.107
RH PM	23.42	0.043	0.264	69.29	-0.054	-0.482
Rainfall	-102.00	1.670	0.803*	16.98	3.070	0.867*

Standard statistical procedure was followed for the analysis.
*Significant at 5%

dead hearts were recorded on 14 and 28 days after emergence (Table 1).

Maximum per cent dead hearts on 14 days after emergence were recorded during 36th meteorological week (45%) when prevailing maximum, minimum temperature and morning and evening relative humidity were 33.1°C,22.1°C, 77.5 and 58.5%, respectively. The per cent dead hearts declined steadily thereafter and touching to its minimum (11.4%) during 39th meteorological week, when morning and evening relative humidity was 85.0 and 55.2%, respectively.

II-On 28 days after emergence :

Maximum per cent dead hearts on 28 days after emergence were recorded during 36th meteorological week (78.8%) when prevailing maximum, minimum temperature and morning and evening relative humidity were 32.7°C,22.1°C, 78.7 and 54.7%, respectively. The per cent dead hearts declined steadily thereafter and touching to its minimum (42.5%) during 38th meteorological week, when morning and evening relative humidity was 81.0 and 53.5%, respectively. Similar results were reported by Shekhar (1995), Nair *et al*., (1995) and Balikai (1999) (Table 2).

Simple correlation studies between weather parameters and per cent dead hearts caused by *Atherigona soccata* :

The data on simple correlation between weather parameters and per cent dead hearts caused by *Atherigona soccata* on 14 days after emergence presented in Table 3. The results brought out significant positive correlation between per cent dead hearts and maximum temperature (r = 0.923*), minimum temperature (r = 0.850*), rainfall (r = 0.803*). Correlation was found to be non significant between per cent dead hearts and relative humidity.

The data on simple correlation between weather parameters and per cent dead hearts caused by *Atherigona soccata* on 28 days after emergence presented in Table 3. The results brought out significant positive correlation between per cent dead hearts and maximum temperature (r = 0.905*), minimum temperature (r = 0.872*), rainfall (r = 0.867*). Correlation was found to be non significant between per cent dead hearts and relative humidity. Rainfall has been found to cause substantial mortality in adult flies (Delobel and Lubega,1984). Nair *et al.*, (1995) reported that oviposition and population dynamics showed highly significant correlation with meteorological parameters, whereas, dead hearts formation was uncorrelated. Similar results were obtained by Nair *et al.*, (1995) and Kandalkar *et al.*,(1996).

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