

## RELATIONSHIP BETWEEN METEOROLOGICAL FACTORS AND THE INCIDENCE OF PEARL MILLET ERGOT DISEASE\*

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Influence of weather factors on the incidence of ergot disease of pearl millet was studied. Rainfall and evening relative humidity had positive correlation with ergot incidence whereas negative association was observed by the maximum temperature.

Ergot disease of pearl millet caused by *Claviceps fusiformis* Loveless, is a serious disease as it reduces the yield drastically and causes health hazards in man and animals (Bhat *et al.*, 1976 and Krishnamachari and Bhat, 1976). Cool and humid weather during flowering stage of the crop favours the spherical stage of the pathogen (Reddy *et al.*, 1969). Increased susceptibility period of inflorescence, availability of inoculum by extended period of honeydew exudation and low night temperature coupled with high humidity, were attributed for increased incidence of ergot (Sharma *et al.*, 1984). The present study reports the influence of weather parameters on the incidence of ergot disease of pearl millet.

### MATERIALS AND METHODS

The seasonal occurrence of ergot disease on pearl millet was assessed in a field experiment. Weekly sowings with three replications were taken during July - November, 1985 and March-May, 1986. The seeds of pearl millet cv Co. 7 were sown in beds of 5 m x 4 m, with 45 cm between rows and 15 cm within rows.

The disease incidence was recorded every week from the date of ear-head emergence, by observing 100 earheads at random and recording the degree of intensity as per the scale adopted by Sharma *et al.* (1984). The per cent disease incidence was worked out following McKinney's (1923) formula.

The weather parameters viz., maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, sunshine and total rainfall were collected and correlated with the ergot disease incidence. In the present study the mean weather parameters that prevailed for seven days prior to the date of observation were taken into consideration for their possible influence on the incidence of ergot disease.

### RESULTS AND DISCUSSION

Ergot disease incidence was more when there was heavy rainfall combined with high relative humidity (Table 1). Simple correlation of data revealed that a significantly negative correlation was observed between maximum temperature ( $r_{yx_1} = -0.4930$ )

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Table 1 : Ergot incidence of pearl millet and weather factors

Date of observation	Ergot incidence (%)	Temperature (°C)		Relative humidity (%)		Total rainfall (mm)	Sunshine (hours)
		Maximum	Minimum	Morning	Evening		
8-9-85	2.0	31.73	21.74	95.43	53.00	5.0	6.60
15-9-85	3.0	31.57	21.53	90.29	55.43	0.0	6.24
22-9-85	7.0	32.47	20.84	89.27	51.71	14.0	8.16
29-9-85	22.0	30.86	20.87	95.14	59.00	63.50	6.30
6-10-85	66.0	30.29	21.94	94.71	74.14	74.14	5.63
13-10-85	48.0	30.76	22.51	94.71	55.57	0.0	7.59
20-10-85	60.0	31.57	20.31	94.29	55.14	8.0	8.93
27-10-85	64.0	31.00	20.40	87.57	53.43	8.10	7.63
3-11-85	66.0	30.16	21.31	85.29	53.86	18.00	6.47
10-11-85	74.0	27.40	21.03	91.86	79.71	115.20	0.83
17-11-85	42.0	27.86	20.71	92.86	71.71	1.20	4.91
24-11-85	72.0	30.21	20.20	93.43	57.14	12.0	7.63
1-12-85	60.0	28.73	15.51	86.57	45.14	0.0	10.43
8-12-85	48.0	27.84	30.00	85.29	61.14	7.50	5.20
15-12-85	24.0	28.91	19.44	85.43	51.71	0.50	7.19
22-12-85	12.0	29.56	19.21	90.43	49.86	0.50	6.60
12-5-86	6.0	35.17	23.19	81.29	37.71	3.00	9.41
19-5-86	30.0	35.83	22.70	76.86	35.43	11.60	9.53
26-5-86	18.0	35.99	23.63	73.00	33.40	0.0	9.73
2-6-86	46.0	33.93	22.14	81.71	47.11	18.0	6.55
9-6-86	26.0	34.59	23.00	73.43	40.57	0.0	8.47
16-6-86	8.0	34.21	22.84	71.86	45.43	0.0	6.83
23-6-86	36.0	29.83	22.96	70.43	59.86	11.40	3.64
30-6-86	40.0	29.66	23.44	76.43	61.29	21.60	3.55

Table 2 : Simple correlation of ergot disease incidence of pearl millet with weather factors (n=24)

	Y	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	X <sub>5</sub>	X <sub>6</sub>
Y	1	-0.4930	-0.1396 <sup>NS</sup>	0.2655 <sup>NS</sup>	0.4986*	0.4175*	-0.2397 <sup>NS</sup>
X <sub>1</sub> (Maximum temperature)		1	0.1860	-0.4998	-0.7955	-0.3170	0.6102
X <sub>2</sub> (Minimum temperature)			1	-0.3548	0.0006	-0.0288	0.2454
X <sub>3</sub> (Morning relative humidity)				1	0.5397	0.3130	-0.1021
X <sub>4</sub> (Evening relative humidity)					1	0.6486	-0.8131
X <sub>5</sub> (Total rainfall)						1	-0.6010
X <sub>6</sub> (Sunshine)							1

NS = Non Significant

and disease incidence. The other parameters *viz.*, minimum temperature ( $ryx_3 = -0.1396$ ) and sunshine ( $ryx_4 = -0.2397$ ) though exhibited negative association were not significant. A positive and significant correlation was observed between disease incidence and weather factors like evening relative humidity ( $ryx_5 = 0.4986$ ) and total rainfall ( $ryx_6 = 0.4195$ ) (Table 2).

Multiple regression analysis revealed that the factors *viz.*, maximum and minimum temperatures, morning and evening relative humidity, total rainfall and sunshine influenced disease incidence to the extent of 51.68 per cent as seen by  $R^2$  value of 0.5168 at 0.05 per cent level. It could be inferred that the increase of sunshine by one hour resulted in decrease of 11.77 per cent of ergot disease incidence (Table 3).

Siddiqui and Khan (1973) and Gour *et al* (1975) observed the ergot incidence under field conditions in Rajasthan, when temperature ranged between 18 to 30°C with a maximum relative humidity of 90 per cent and 1 to 5 hr of sunshine per day during the first five to six days of flowering. Sivaprakasam (1976) and Saxena *et al* (1977) too have reported that rainfall and humidity exhibited positive relationship and sunshine and temperature a negative association with disease incidence.

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