

## Role of environmental factors on *Alternaria*-leaf spot of dolichos bean

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Effect of environmental parameters on *Alternaria* leaf spot of dolichos bean caused by *Alternaria alternata* was studied under field conditions during 1993-94 and 1994-95. The most important weather factors in both crop seasons favouring maximum disease intensity were the average temperatures and relative humidities ranging from 26<sup>o</sup>-28<sup>o</sup>C (max.) to 11<sup>o</sup>-13<sup>o</sup>C (min.) and 72-77 per cent (max.) to 51-54 per cent (min.). Maximum and minimum disease intensity were found in the third week of November and first week of October in both the test years, respectively.

**Key words :** *Alternaria alternata*, intensity of *Alternaria* leaf spot, dolichos bean, rainfall, relative humidity, temperature

### INTRODUCTION

Dolichos bean (*Lablab purpureus* (L.) Sweet) is an important vegetable crop widely grown in different states of India and abroad. This crop is used mainly as green pods which are eaten and cooked as green vegetable, but sometimes in dry form as pulse. Besides being a rich source of carbohydrates, proteins, minerals and vitamins for human beings, it also enriches the soil, fixing atmospheric nitrogen by the root nodule bacteria and has the quality of preventing soil erosion.

High yield potential of this crop is affected by several diseases. One of them is *Alternaria* leaf spot incited by *Alternaria alternata*. The climatic conditions in Uttar Pradesh generally favour disease development during both the crop seasons. Goyal (1966) made first report of this new and serious disease caused by *Alternaria alternata* (Fr.) Keissler from Rajasthan. Information on the role of environmental factors may be helpful in forecasting and management of this disease on which no information is available, so far. Studies on this aspect of *Alternaria* leaf spot of dolichos bean were, therefore, undertaken in field conditions at Kanpur, the results of which are reported in this paper.

### MATERIALS AND METHODS

To study the role of atmospheric temperature, relative humidity and rainfall on intensity of this disease, a trial was conducted at Vegetable Research Farm, Kalyanpur, Kanpur during 1993-94 and 1994-95. A highly susceptible dolichos bean variety 'Kalyanpur Type-1' was sown in 1st August in 4.0 m x 2.0 m plots with 80 cm x 40 cm spacing of row to row and plant to plant. The plots were watered periodically as and when necessary. Ten plants were randomly selected in each plot and data on disease intensity alongwith environmental factors were recorded at weekly intervals starting from first week of October upto February 3 in both the years. Disease intensity was noticed on the basis of percentage leaf area covered using the following 0-5 scale : 0 = No disease symptom on leaf; 1 = Less than 5% leaf area covered; 2 = 5-10% leaf area covered; 3 = 10-20% leaf area covered; 4 = 20-30% leaf area covered; and 5 = More than 30% leaf area covered

Disease intensity was calculated using the formula :

$$\text{Percentage Disease intensity} = \frac{\text{Sum of disease ratings} \times 100}{\text{Total number of ratings} \times 5}$$

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**Table 1** : Role of environmental factors on *Alternaria* leaf spot of dolichos bean under field conditions

Date	Average temperature (°C)				Average relative humidity (%)				Rainfall (mm)		Disease intensity (%)		
	1993-94		1994-95		1993-94		1994-95		1993-94	1994-95	1993-94	1994-95	
	Max	Min	Max	Min	Max	Min	Max	Min					
October	7	34.00	22.44	34.41	18.60	73.86	57.60	65.57	59.62	—	—	9.36	7.90
October	14	34.57	19.85	34.10	18.22	67.84	55.00	62.14	54.78	—	—	11.55	9.92
October	21	33.57	15.55	31.90	14.12	64.86	58.71	64.42	55.60	—	—	14.10	12.56
October	28	31.29	17.00	32.01	16.43	65.43	48.29	60.57	56.57	—	—	16.39	17.87
November	4	30.57	14.00	31.50	13.87	59.57	53.37	70.85	57.51	—	—	20.68	21.72
November	11	28.16	13.00	28.60	13.70	63.20	46.86	70.18	50.26	—	—	27.19	25.38
November	18	26.13	12.45	27.30	11.85	76.50	53.95	72.57	51.14	—	—	31.80	29.25
November	25	26.56	12.04	26.75	13.15	72.14	50.78	69.70	58.45	—	—	31.25	28.71
December	2	25.50	10.36	26.15	12.32	66.86	52.50	71.00	60.15	—	—	30.85	27.25
December	9	24.66	10.02	25.30	11.42	68.29	62.42	65.70	58.55	—	—	27.46	26.47
December	16	23.47	9.00	23.91	8.05	72.00	55.86	65.85	53.00	—	—	25.65	23.16
December	23	22.43	8.10	23.00	7.18	79.00	62.00	63.14	50.57	—	—	22.56	20.39
December	30	22.71	7.29	24.62	7.68	82.85	63.00	74.57	60.85	—	—	20.38	18.77
January	6	24.14	9.00	22.47	8.39	80.14	57.86	78.00	50.29	—	—	18.90	16.64
January	13	23.86	10.83	18.28	9.81	81.57	76.85	92.10	84.47	2.06	2.31	17.91	19.68
January	20	18.71	8.20	18.00	7.54	86.14	70.57	90.29	78.14	0.8	—	14.80	15.70
January	27	23.29	9.29	21.83	8.58	71.85	52.72	85.83	64.57	—	—	12.92	10.35
February	3	24.00	9.86	24.16	9.11	69.86	48.29	68.71	55.43	—	—	10.90	8.62

## RESULTS AND DISCUSSION

It is evident from the results presented in Table 1 that the disease first observed in the first week of October, the disease intensity increased gradually upto third week of November and after that it declined upto first week of February during 1993-94 and 1994-95. During 1993-94, the maximum disease intensity was found in the third week of November when the average temperatures and relative humidities were 26.13°C (max.) and 12.45°C (min.) with 76.50 per cent (max.) and 53.95 per cent (min.), respectively (Fig. 1). Likewise in 1994-95, the corresponding temperature and relative humidity were 27.30°C, 11.85°C, 72.57 per cent and 51.14 per cent which led to maximum disease intensity (Fig. 2). Minimum disease development occurred in the first week of October due to higher temperature during both the years. Although, there was some precipitation in the second week of January in both the test seasons and third week of January in the first year which resulted in increase of relative

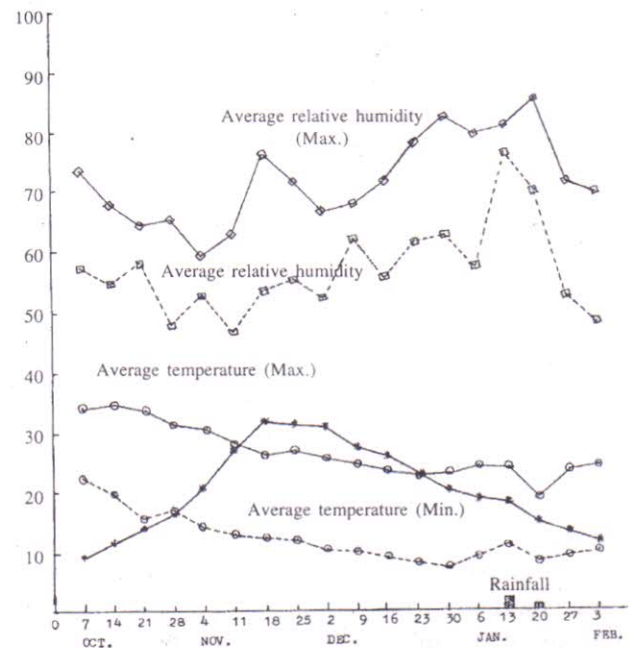


Fig : 1. Role of average temperature relative humidity and rainfall on disease intensity in 1993-94.

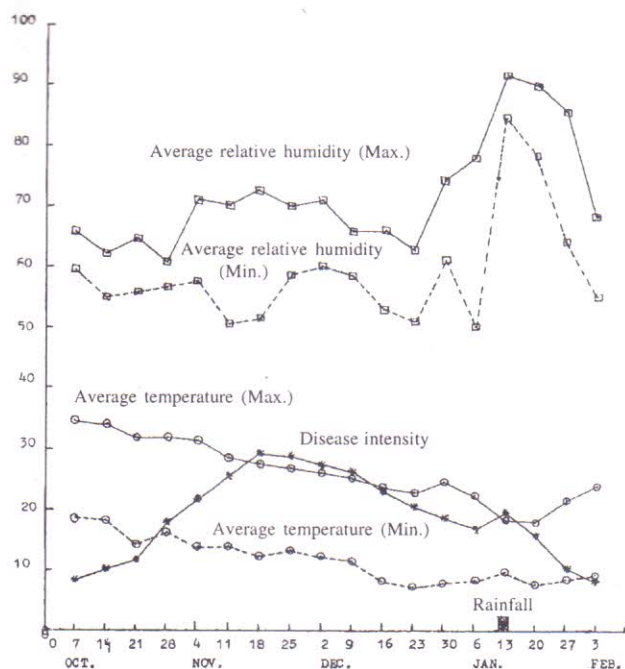


Fig : 2. Role of average temperature, relative humidity and rainfall on disease intensity during 1994-95.

humidity but the disease intensity continued to dip down indicating thereby that rainfall in January does not exert any positive role on disease development.

Dingar and Singh (1985) recorded that the leaf spot of brinjal incited by *Alternaria alternata* reaches to pick during the last week of October and first week of November when average temperature was 24<sup>o</sup>-26<sup>o</sup>C. Ghewande (1986) observed that temperature between 25<sup>o</sup> to 29<sup>o</sup> C and relative humidity of 87 per cent were most favourable for *Alternaria* leaf spot of groundnut caused by *A. alternata*. According to Bhargava and Khare (1988), *Alternaria* blight of chickpea (*A. alternata*) also favoured at temperature between 25<sup>o</sup> to 27<sup>o</sup>C

and 80 per cent relative humidity. Kumar and Singh (1996) noticed that the most important weather factors favouring *Alternaria* leaf spot of sunflower caused by *A. alternata* were the temperature and relative humidity ranging from 27<sup>o</sup> to 29<sup>o</sup>C and 78 to 80 per cent, respectively. The results of these workers were more or less similar with the present findings.

Thus, the present studies reveal that the moderate atmospheric temperature accompanied with nearly moderate relative humidity proved epidemiogenic for *Alternaria* leaf spot of this crop.

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