SHORT COMMUNICATION

A CASE STUDY ON DEVELOPMENT OF DISEASE IN RELATION TO WEATHER PARAMETERS ON ALTERNARIA BLIGHT (*ALTERNARIA PORRI*) OF GARLIC

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Abstract: The present study was carried on Alternaria blight (*A. porri*) of garlic on the effect of weather parameters on the development of the disease. Purple blotch development observed a negative correlation with minimum temperature (r = -0.004), relative humidity (r = -0.775) and rainfall (r = -0.258) whereas the maximum temperature (r = 0.870) exhibited a positive correlation with the disease progress**.** The results indicated that the purple blotch was favored by high maximum temperature coupled with low minimum temperature, low relative humidity and low rainfall during the crop seasons.

Keywords: Alternaria blight, Development of disease, Garlic, Weather parameters

INTRODUCTION

Garlic (*Allium sativum* L.) belonging to family Liliaceae is one of the important commercial spices or condiment crops, second among *Allium* spp. grown in India in almost every kitchen for seasoning and flavouring the food. It possesses manifold uses, including nutritive and medicinal properties. The crop is believed to be originated from central Asia. In Madhya Pradesh Malwa Plateau zone has been declared as an Agricultural Export Zone for potato, onion and garlic crops. The crop suffers from many diseases but Alternaria blight caused by *Alternaria porri* (Ellis) Cif. is a disease of economic importance. The disease appears in the form of black spots on the leaves in the early stage. Small sunken lesions with purple centre enlarge and girdle the seed stalk. Under favourable environment, the affected stalks breakdown and die within 3 to 4 weeks. Alternaria spores germinate on garlic leaves and produce small, water soaked spots that turn brown. The elliptical lesion enlarges, becomes zonate (target spot) and purple. During moist weather, the surface of the lesions may be covered by brown to black masses of fungal spores. Spores may be blown or washed down to the neck region and infect the outer scales of bulbs through wounds or the neck tissue. As the disease advances the leaves get blighted and infection spreads to the bulb resulting in its decay. Suheri and Price (2000) stated that the number of lesions in onion caused by *Alternaria porri*, increased with increase of temperature and duration of leaf wetness. Higher disease incidence during spring and autumn was due to longer leaf wetness periods in autumn. Dubey (2005) observed that the temperature, wind velocity and sunshine were positively correlated and relative humidity was negatively correlated with development of Alternaria blight in broad bean. With this background in view the present investigation were under taken to study on development of disease in relation to weather parameters on Alternaria blight caused by *Alternaria porri* of garlic

MATERIAL AND METHODS

Development of purple blotch in relation to weather parameter

Weekly observations on the development of purple blotch were recorded starting from 15 days after sowing till harvest. The weekly weather data for the period of observations i.e. 17th December, 2008 to 25th February, 2009 were recorded for maximum and minimum temperature (ºC), relative humidity (%) and rainfall (mm).

The coefficient of correlation (r) was calculated between two variable $X_1/X_2/X_3/X_4$ with Y (X_1 to X_4 indicated weather variables, Y as the disease intensity) using the formula

$$r = \frac{\frac{\sum xy}{n} - \bar{x}\,\bar{y}}{\sqrt{\left(\frac{\sum x^2}{n} - \overline{x^2}\right)\left(\frac{\sum y^2}{n} - \overline{y^2}\right)}}$$

Where,

x_1 = Maximum temperature (ºC)
x_2 = Minimum temperature (ºC)
x_3 = Rainfall (mm)
x_4 = Humidity (%)

(r is always less than 1 and lies between -1 and +1, employing the test of significance.)

Table 1: Correlation of development of purple blotch with different weather parameters

Week No.	Meteorological week/dates	Disease incidence (%)	Temperature (ºC)		Rainfall (mm)	Relative humidity (%)
			Max.	Min.		
51	17-23 Dec.	2	22.5	13.1	2	80.1
52	24-30 Dec.	4	22.2	17.6	0	83.3
1	31 Dec. 08-6 Jan. 09	10	22.0	9.5	0	77.4
2	7-13 Jan.	15	19.6	11.9	28.6	90.0
3	14-20 Jan.	25	26.0	14	0	83.4
4	21-27 Jan.	31	26.4	9.9	0	77.0
5	28 Jan.-4 Feb.	38	26.3	10.6	0	77.5
6	5-11 Feb.	42	26.1	19.4	0	69.0
7	12-18 Feb.	45	26.9	10.8	0	68.0
8	19-25 Feb.	52	30.1	13.7	0	64.0

Sources: Meteorological observatory, AICRPDA, College of Agriculture Indore.

RESULT AND DISCUSSION

Correlation of development of purple blotch with various weather factors

The incidence of purple blotch was computed by recording the disease severity in the crop for 10 weeks starting from first appearance of the disease. The meteorological data on maximum and minimum temperature (ºC), relative humidity (%) and rainfall were recorded 7 December, 2008 to 25th February, 2009. The disease incidence was later correlated with meteorological data on these four factors at weekly intervals. The data have been presented in Table 2.

Table 2: Correlation of development of purple blotch with various weather parameters

SN	Meteorological week/dates	Disease incidence (%)	Temperature (ºC)		Rainfall (mm)	Relative humidity (%)
			Max.	Min.		
51	17-23 Dec.	2	22.5	13.1	2	80.1
52	24-30 Dec.	4	22.2	17.6	0	83.3
1	31 Dec. 08-6 Jan. 09	10	22.0	9.5	0	77.4
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8	19-25 Feb.	52	30.1	13.7	0	64.0
	r =		**0.870**	**-0.004**	**-0.258**	**-0.775**

Purple blotch development observed a negative correlation with minimum temperature (r = -0.004), relative humidity (r = -0.775) and rainfall (r = -0.258) whereas the maximum temperature (r = 0.870) exhibited a positive correlation with the disease progress**.** This indicated that the disease is favoured by lower minimum temperature, low rainfall and lower relative humidity coupled with higher maximum temperature during the crop seasons. Disease incidence (%) was observed between 14th January to 25th February whereas relative humidity (64.0-83.4%), maximum temperature (26.0-30.1 ºC) and minimum temperature (0.13.7-14 ºC) were conditions for disease progress.

Shrivastava *et al*. (1994) recorded higher incidence of purple blotch on onion in *Kharif* as well as *Rabi* when high humidity prevailed during the seasons, however, during the present study the disease development was favoured by moderate R.H. i.e. 64.0 to 90.0%. Miller and Lacy (1995) & Bisht and Agrawal (1993) observed purple blotch of *Allium* spp. especially in warm and humid environment. Similarly Mishra and Krishna (2001) recorded that lower minimum temperature and higher maximum temperature and high rainfall were congenial for the Alternaria blight in cotton. These findings on development of Alternria blight on different crops support the present observations for temperature but do not agree with the role of high R.H. during *Rabi*.

REFERENCES

Bisht, I.S. and R.C. Agrawal (1993). (a) Susceptibility to purple blotch leaf spot (*Alternaria*

porri) in garlic (*Allium sativum*). *Ann. of Applied Biology*, **31** (8): 122-123.

Dubey, S.C. (2005). Influence of weather factors on development of Alternaria blight *J. Mycol. Pl. Pathol*., **35**(2):369.

Miller, M.E. and M.L. Lacy (1995). Purple blotch. In: Schwartz HF, Mohan SK, eds. *Compedium of Onion and Garlic diseases.* St. Paul, MN: APS Press, **4**: 23.

Mishra S.P.and A. Krishna (2001). Influence of crop density on the development of *Alternaria* blight in cotton. *Ann. Plant Soil Res*., **3**: 264-66.

Shrivastava, P.K., B.S. Bhardwaj and P.P. Gupta (1994). Status of field disease and select pest of onion in India. *Neweletter National Hort. Res. Dev. Foundatio*n, **14**: 11-14.

Suheri, H. and T.V. Price (2000). Infection of onion leaves by *Alternaria porri* and *Stemphylium vesicarium* and disease development in controlled environments. *Plant Pathology*. **49**(3): 375-382.