



Influence of abiotic environmental factors on purple blotch disease (*Alternaria porri* Eliss CIF.) of onion

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Abstract : The influence of environmental factors on the development of purple blotch of onion *Alternaria porri* Elis Ciff. was studied under both laboratory and field conditions. Conidial germination (71.0 %) and germ tube length (46.0 µm) were recorded maximum at 28° C. High relative humidity favuored conidial germination and germ tube length. Under field conditions, temperature and RH play an important role in the disease development. Range of temperature 25.50- 28.00 and 26.5-27.2, RH 88-76 per cent and 80-78 per cent favoured highest disease incidence during 2008 and 2009 seasons, respectively.

Key Words : *Alternaria porri* , Purple blotch, Onion

View Point Article : Ansar, Mohammad and Dabbas, M.R. (2012). Influence of abiotic environmental factors on purple blotch disease (*Alternaria porri* Eliss CIF.) of onion. *Internat. J. agric. Sci.*, 8(1): 171-173.

Article History : Received : 24.06.2011; Revised : 29.09.2011; Accepted : 18.11.2011

INTRODUCTION

Onion is found in a large number of recipes and preparations spanning almost the totality of the world's cultures. The whole plant is edible and is used as food in some form or the other. This is one of most important vegetable cum condiment crop grown in round the year in all over Uttar Pradesh. Due to condition of cultivation purple blotch (*Alternaria porri*) has assumed problem in north India. Purple blotch is one of the important disease of onion in the state that limits yield and quality bulb of crop during the *Rabi* season. Purple blotch causes loss about 20-60 per cent in bulb yield and extent of loss depend on time of infection and stage of crop growth (Thind and Jhooty, 1982). Various environmental factors like temperature RH play important role in the development of the disease in field (Asiosa *et al.*, 1986). Quantification of critical environmental factor responsible for initiation and subsequent spread of disease was attempted for the development of need based application of fungicide through effective prediction and warning system.

MATERIALS AND METHODS

Conidia from freshly sporulating colonies were gently dusted on the clean glass slide by placing them in rectangular glass settling tower (1x1x1.5") with the help of small motorized air pump use for aerating an aquarium to get air pressure for blowing of conidia (Stevens, 1916). To determine the influence of temperature, the slides were kept in Petri plates (90 mm dia) containing moistened cotton wool were transferred to incubators maintained at different temperature and moist chamber at maximum RH.

All the treatments were replicated three times. Another set of Petri plates was sealed with paraffin film and transferred to an incubator maintained at 25±2°C. Slides were microscopically examined after 24 hrs to record conidial germination and germ tube length. About 300 conidia selected randomly from different microscopic field were examined to calculate germination (%) and germ tube length.

Meteorological factor and disease development:

A field experiment was laid out a vegetable farm

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Kalyanpur Kanpur in randomized block design during 2008 and 2009 and each treatment was replicated thrice. Seed of moderately susceptible variety Kalyanpur Red Round was sown in second week of October in the plots (3x2 mt) and maintained a spacing of 20x5 cm. The incidence of purple blotch on onion plant was calculated by formula DI (Disease incidence) = Total no. of infected plant / Total no. of observed plants x 100 at weekly interval starting from January in both years.

RESULTS AND DISCUSSION

The maximum conidial germination and germ tube length (Table 1) was recorded at 28°C while the minimum was at 18°C. At 38°C no germination and elongation in conidial germ tube length was recorded. Similar observations were recorded by several workers that temperature 22-30°C found to be ideal for germ tube growth of *A. porri* (Everts and Lacy, 1990; Dater, 1994).

Gupta and Pathak (1988) reported that conidial germination was maximum when RH prevailed for six hours or more at 25 °C and there was no conidial germination at more than 30°C or less than 15°C but in present studies the optimum was 28°C for conidial germination and minimum 18°C. High

RH favoured enhanced germination of conidia and germ tube elongation, which ultimately result in higher infection of the plant. Conidia of *A. porri* can germinate over a wide range of RH and temperature as observed by Khare and Neema (1982).

The disease appeared during the third fortnight of January with the initiation of cool dry conditions during a day and cool night (Table 2), such conditions enough for dew formation that influenced favourable temperature and RH so initial for disease initiation. The disease incidence (DI) was more when temperature reached around 25°C are more in March.

It is well clear from data presented in Table 2 that disease incidence was greatly influenced by temperature and relative humidity. In general, comparatively higher disease incidence (48.0 and 48.6) was in third and fourth week of March, 2008. The incidence (41.3 and 42.0) was recorded in fourth and last week of March in the year of 2009. But there was no further increase in DI after fourth week of March in 2008. The incidence was more when the temperature reached around 28°C and max RH 86-76 per cent in 2008. In season 2009 DI was recorded more at that time temperature and maximum RH were 27.2°C and 80-78, respectively.

Table 1 : Effect of temperature regimes on germination and germ tube length of conidia

Temperature (°C)	Conidial germination (%)	Germ tube length (µm)
18	21.6	38.0
23	37.6	40.3
28	71.0	46.0
33	36.6	22.6
38	00.0	00.0
C.D. (P=0.05)	2.00	1.26

Table 2 : Effect of meteorological factor on purple blotch development of onion

Date	2008			2009		
	Temp.	RH (Max)	DI	Temp.	RH (Max)	DI
20 January	15.5	84	17.6	16.0	78	15.3
27 January	12.9	88	22.3	14.9	70	20.6
03 February	14.5	91	27.0	15.3	75	24.0
10 February	13.5	89	35.0	18.0	83	27.0
17 February	19.2	92	39.6	20.0	77	32.0
24 February	21.5	90	40.3	22.0	88	35.0
02 March	22.5	92	42.3	23.5	85	37.0
09 March	22.5	93	48.0	23.5	90	38.3
16 March	25.5	88	48.6	24.0	83	39.3
23 March	28.0	76	48.6	26.5	80	41.3
30 March	29.0	71	48.6	27.2	78	42.0
C.D. (P=0.05)			3.09			3.53

RH-Relative humidity,

D₁-Disease

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