

## Effect of Temperature, Relative Humidity and Light on Lesion Length Due to *Alternaria Porri* In Onion

**Key words :** Relative Humidity, Temperature.

Onion (*Allium cepa* L.) is an important bulb crop of India belonging to the family Alliaceae. In India, the onion crop occupies an area of 0.4546 million hectares with a total production of 6034.25 million tonnes (Anonymous, 2005-06). In Andhra Pradesh, it is grown over an area of about 0.022 million hectares with an annual production of 197 million tonnes (Anonymous, 2005-06). In Guntur district of Andhra Pradesh it is cultivated in an area of 0.001239 million hectares with an annual production of 0.019680 million tonnes (Anonymous, 2006). Several factors contribute to the low productivity of onion. Diseases like purple blotch, downy mildew, *Stemphylium* blight, basal rot and storage rot are known to be more significant in reducing the production of the crop. Of these, purple blotch is the most destructive disease, prevalent in almost all onion growing areas of the world causing heavy losses under field conditions. In Guntur district the disease has become prevalent causing heavy losses to onion farmers in recent times. Present investigation was carried out to find the effect of temperature, relative humidity and duration of length of purple blotch severity on onion.

To study the effect of temperature on the infection of onion by *Alternaria porri*, experiment was conducted by using detached onion leaves. Onion leaves of 8 to 9 cms length were allowed to float on 5% sucrose solution (20 ml) in a bottom half of a Petri dish. These leaves were inoculated by spraying them with the conidial suspension ( $2.8 \times 10^2$  spores/ml) and then incubated for about 7 days in BOD incubators set at different temperatures viz., 15°C, 20°C, 25°C, 30°C, 35°C and 40°C. Three replications were maintained for each temperature and three leaves constituted one replication. After incubation the length of the lesion was recorded for each temperature level.

In order to study the infection of onion by *Alternaria porri* under different regimes of light and darkness, detached onion leaves techniques as described earlier was followed with different regimes of light at room temperature ( $28 \pm 1^\circ\text{C}$ ) as given below:

1. Continuous light 24 h
2. Continuous darkness 24 h
3. Alternate light 12 h and darkness 12 h.

The Petri dishes containing inoculated leaves were kept at 25 cm below a pair of 40 watts cool day light fluorescent lamps for exposure to continuous light 24 h (Treatment 1). The plates were wrapped with black paper and maintained to ensure continuous darkness 24 h (Treatment 2). For the third treatment the plates were exposed to continuous light 12 h and continuous darkness 12 h alternately. Each treatment was replicated seven times and each replication consisted of three leaves. All the treatments were maintained for 7 days after which the length of the lesion was recorded in centimeters.

To know the effect of relative humidity on the infection of onion by *Alternaria porri*, onion leaves inoculated with the conidial suspension ( $2.8 \times 10^2$  spores/ml) of the fungus were incubated at different relative humidity levels in desiccators ranging from 75 to 100 % at room temperature ( $28 \pm 1^\circ\text{C}$ ). Saturated salt solutions with excess of salt were used to maintain different relative humidity levels. The saturated solutions of different Analar grade salts were prepared as described in by Dhingra and Sinclair (1993) and transferred into separate desiccators which were kept for 24 h at 20°C to maintain desired levels of relative humidity.

The inoculated leaves floated on 5% sucrose solution (20 ml) in the bottom half of a Petri dish were incubated and kept in desiccators for 7 days. For each level of relative humidity four replications were maintained and each replication consisted of three leaves. The length of the lesion was recorded as explained earlier.

The results in Table 1 revealed that the purple blotch disease lesion development occurred over temperatures ranging from 15°C to 35°C, with maximum lesion length (7.36 cm) recorded at 25°C. Temperature beyond and below 25°C caused significant reduction in the length of the lesion. No lesion development was recorded at 40°C. The

Table 1: Effect of temperature on the infection of onion by *Alternaria porri*

Sl. No.	Temperature (°C)	Length of the Lesion (cm)
1	15	2.04 (8.13)
2	20	4.94 (12.79)
3	25	7.36 (15.79)
4	30	3.28 (10.47)
5	35	1.66 (7.49)
6	40	00.00 (00.00)
C V (%)		0.04
C.D. at 1% level		0.15

Values in parenthesis are Arc sine transformed values

Table 2. Effect of light on the infection of onion by *Alternaria porri*

Treatments	Length of the lesion (cm)
Continuous light (24 h)	7.80 (16.22)
Continuous darkness (24 h)	2.13 (8.33)
Alternate light (12 h) and darkness (12 h)	5.90 (14.06)
C V (%)	0.03
C.D. at 1% level	0.12

Values in parenthesis are Arc sine transformed values

Table 3. Effect of relative humidity on the infection of onion by *Alternaria porri*

Sl. No.	Relative Humidity (%)	Length of the lesion (cm)
1	75	1.53 (7.03)
2	80	2.56 (9.28)
3	85	3.24 (10.30)
4	90	7.04 (15.34)
5	95	7.90 (16.32)
6	100	6.73 (15.00)
C V (%)		0.02
C.D. at 1% level		0.08

Values in parenthesis are Arc sine transformed values

results of the present study indicated 25°C as optimum for the development of onion purple blotch disease.

The results presented in Table 2 revealed that the maximum lesion length of 7.80 cm was recorded with continuous light (24 h). However, exposure to alternate darkness and light could result in a lesion of 5.90 cm, while the lesion was 2.13 cm long when it was exposed to continuous darkness (24 h), indicating continuous light favored the optimum development of purple blotch disease lesion.

The results presented in Table 3 revealed that with the increase in the levels of relative humidity from 75% to 95%, there was a significant increase in the length of purple blotch disease lesion on the inoculated detached onion leaves. The maximum length of purple blotch disease lesion of 7.90 cm was observed at 95% relative humidity followed by 7.04 cm and 6.73 cm at 90% and 100% relative humidity, respectively. The purple blotch disease lesion measured 1.53 cm, 2.56 cm and 3.24 cm at 75, 80 and 85% relative humidity, respectively.

The findings of the present study are corroborated by Khare and Nema (1984) who reported maximum disease development at 25°C

temperature, continuous light (24 h) followed by alternate darkness and light. The disease development was least when it was exposed to continuous darkness and 75% relative humidity followed by 80%.

However, Gupta and Pathak (1986) observed maximum disease development (75%) when the plants were kept under 100% relative humidity for 120 h.

#### LITERATURE CITED

**Anonymous 2005-06.** Directorate of Economics and Statistics New Delhi.

**Anonymous 2006.** Statistical Abstract of Andhra Pradesh

**Dhingra O D and Sinclair J B 1993.** Basic Plant Pathology Methods. C R C Florida USA.

**Gupta R B L and Pathak V N 1986.** Effect of age of host, inoculum density and duration of high relative humidity on development of purple blotch of onion. *Phytophylactica* 18: 151-152.

**Khare U K and Nema K G 1984.** Factors affecting development of purple blotch (*Alternaria porri*) on onion leaves. *Indian phytopathology* 37: 327-328.

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