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***Short Communication***

# Effect of meteorological parameters on growth and sporulation of alternaria alternata causing alternaria fruit rot of brinjal

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Brinjal (*Solanum melongena* L.) is a major solanaceous vegetable crop of India. It contributes about 12.47 per cent of the total production of vegetables in India. In Rajasthan, it is grown in all districts in an area of 5738 hectares with 37253 metric tonnes production and productivity of 6.49 metric tonnes per hectare (Anonymous, 2007-08). A heavy infection of *Alternaria* fruit rot of brinjal caused by *A. alternata* (Fr.) Keissler was observed in the vicinity of Jobner (Jaipur). In India, the disease *Alternaria* fruit rot of brinjal was first reported from IARI, New Delhi. This disease is severe and appears regularly, causing heavy losses in fruit yield. The disease appear in two phases, leaf spot and fruit rot. The disease first makes its appearance in young seedling during the rainy season (July-August) which is blighted. They give a cherry appearance and finally die out. In September, it attacks on leaves and then spread to fruits which rot and become unfit for consumption. Lesions of fruits are first observed during February. They start as small (above 1/ 2cm in size), concentric, dark brown and sunken spots. Colour of the lesions become olivaceous dark brown due to spore formation. Several lesions may coalesce and cover the entire surface of the fruit (Kapoor and Hingorani, 1958). Fungus produces muriform conidia and usually formed in chains (Fig. 1 & 2). To find out the role of environmental factors such as temperature, relative humidity and light/darkness on the disease development, *in vitro* studies were conducted at Department of Plant Pathology, SKN, College of agriculture, Jobner during 2009-10.

To study the effect of temperature on mycelial growth and sporulation the pathogen, 20 ml of sterilized PDA medium was poured in sterilized Petri-plates. Inoculation was made with 5 mm disc from 7 days old pure fungal culture and incubated at 5 different temperatures *viz.*, 15, 20, 25, 30 and 35°C. Observations were recorded at 4th and 7th days after incubation. Each treatment was replicated four times.

To study the effect of relative humidity on mycelial growth and sporulation, the pathogen on PDA medium was inoculated similar to the previous experiment and incubated at 60, 70, 80, 90 and 100 per cent relative humidity. The different relative humidity levels were maintained by the method suggested by Buxton and Mellanby (1934). Composition of the acid solution used was as follows.

| Relative humidity (%) | Stock solution (ml)* | Distilled water (ml) |
|---|---|---|
| 60 | 374.0 | 396.0 |
| 70 | 348.0 | 510.3 |
| 80 | 294.0 | 640.0 |
| 90 | 161.0 | 712.0 |
| 100 | 0.00 | Only distilled water |

* 50 % v/v solution of concentrate sulphuric acid

Observations and treatments were similar to the previous experiment.

To study the effect of light / darkness on mycelial growth and sporulation of *A. alternata,* the fungus was grown in four different growth chambers set at different light/dark cycles *viz.*, 24 hrs light /0 hrs darkness, 16 hrs light/ 8 hrs darkness, 8 hrs light/ 16 hrs darkness, 0 hrs light/ 24 hrs darkness. Observations were recorded at 4th and 7th days after incubation.

The temperature for the radial growth of fungus varied for all treatments. It is evident from the data (Table 1 and Fig. 3) that the pathogen grew at all the temperature i.e. 15, 20, 25, 30, and 35°C both at 4th and 7th days after incubation. Maximum mycelial growth 86.00 mm and excellent sporulation was observed at 25°C. A gradual decrease in mycelial growth and sporulation was observed at 30°C and 35°C. However the temperature 20°C and 30°C favoured good mycelial growth and sporulation of *A. alternata* but differ significantly from the growth at 25°C. Minimum mycelial growth i.e. 10.00 and 16.00 mm and fair sporulation was observed at 15°C temperature at 4th

**Table 1.** Effect of temperature, relative humidity and light/darkness on mycelial growth and sporulation of A. alternata

| S.No. | Temperature (°C) | Mycelial growth (mm)* | | Sporulation | Relative humidity (%) | Mycelial growth (mm)* | Sporulation | Duration of light / darkness | Mycelial growth (mm)* | | Sporulation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | After 4 days | After 7 days | | | | | | After 4 days | After 7 days | |
| 1. | 15 | 10.00 | 16.00 | + | 60 | 34.80 | + | 24 hrs light / 0 hrs darkness | 20.76 | 40.24 | + |
| 2. | 20 | 34.42 | 54.56 | +++ | 70 | 46.00 | ++ | 16 hrs light / 08 hrs darkness | 34.40 | 60.74 | ++ |
| 3. | 25 | 44.52 | 86.00 | ++++ | 80 | 56.28 | +++ | 08 hrs light / 16 hrs darkness | 48.24 | 74.46 | +++ |
| 4. | 30 | 38.42 | 62.14 | +++ | 90 | 82.40 | ++++ | 0 hrs light / 24 hrs darkness | 56.44 | 80.00 | ++++ |
| 5. | 35 | 26.42 | 30.60 | ++ | 100 | 78.42 | ++++ | - | - | - | - |
| SEm+ | | 0.21 | 0.30 | | | 0.37 | | | 0.26 | 0.40 | |
| CD at 5% | | 0.65 | 0.95 | | | 1.16 | | | 0.84 | 1.31 | |

* Average of four replications; Note: - + = Fair , ++ = Good, +++ = Very good, ++++ = Excellent

and 7th days after incubation respectively. The results showed closed proximity with the previous studies by Ma-Guilong *et al.* (2006) who showed 24°C was the most suitable temperature for mycelial growth and sporulation of *A. alternata*. Whereas, Singh *et al.* (2001) and Isra Ram *et al.* (2007) found 20 to 30°C temperature range was suitable for *A. alternata*. It can be concluded that 25°C is the optimum temperature for mycelial growth and sporulation of *A. alternata*.

***Effect of relative humidity***

All five humidity levels (Table 1 and Fig. 4) induced the mycelial growth and sporulation of *A. alternata*. Maximum mycelial growth (82.40 mm) and excellent sporulation was recorded at 90 per cent relative humidity closely followed by 100 per cent (78.42 mm and excellent sporulation) relative humidity. A significant decrease in mycelial growth and sporulation was observed at 80 and 70 per cent relative humidity. The results are in close conformity with the observations of Prasad and Roy (1979) who observed maximum growth and sporulation of *Alternaria alternata* at 90-100 per cent relative humidity. Previous studies showed that the relative humidity more than 90% induced maximum conidial germination (Chen *et al.,* 2000 and Sugha *et al.,* 2002) and sporulation (Ma-Guilong *et al.,* 2006) of *A. alternata.* It can be concluded from the present studies that high relative humidity favours the mycelial growth and sporulation of the pathogen.

***Effect of light / darkness***

The maximum mycelial growth (56.44 and 80 per cent) and excellent sporulation was observed in treatment of 24 hrs darkness followed by 08 hrs light / 16 hrs darkness (48.24 and 74.46 per cent respectively) with very good sporulation (Table 1). *In vitro* studies on different light/darkness cycles revealed that 0 hrs light/24 hrs darkness supported maximum mycelial growth and sporulation of *A. alternata*. Minimum mycelial growth and sporulation was observed at 24 hrs light/0 hrs darkness. Khandelwal (1974) observed that several members of the genus *Alternaria* have been reported to be light sensitive. Singh *et al.* (2001) studied the effect of light/darkness on germination and sporulation of *Alternaria tenuissima* and observed maximum conidial germination in total darkness followed by 8 hrs light/16 hrs darkness and 16 hrs light/ 8 hrs darkness, respectively. The results from present studies indicated that fungus grew best in continuous darkness followed by alternate light and darkness.

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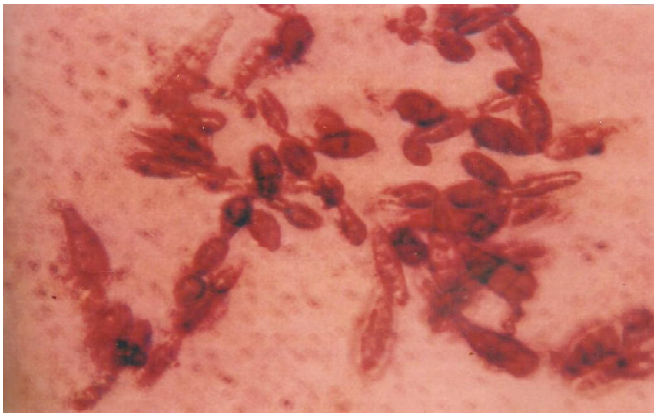

**Fig. 1 :** Conidia of *A. alternata*

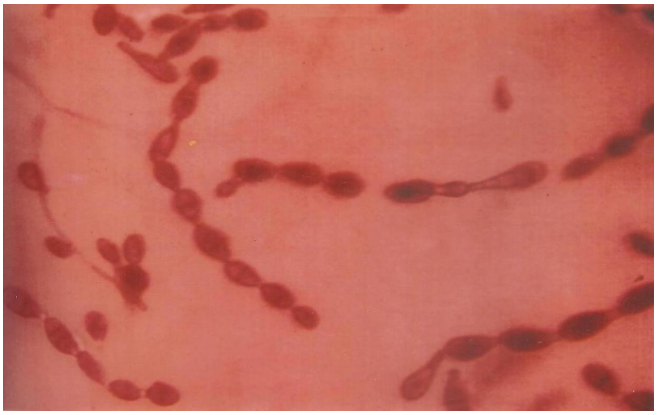

**Fig. 2 :** Chain of conidia of *A. alternata*

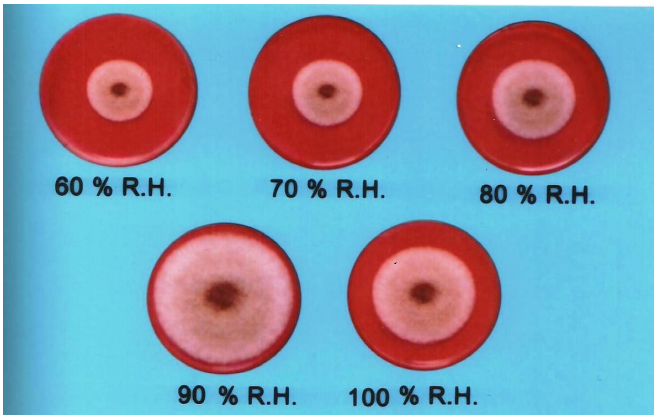


**Fig. 3 :** Effect of temperature on mycelial

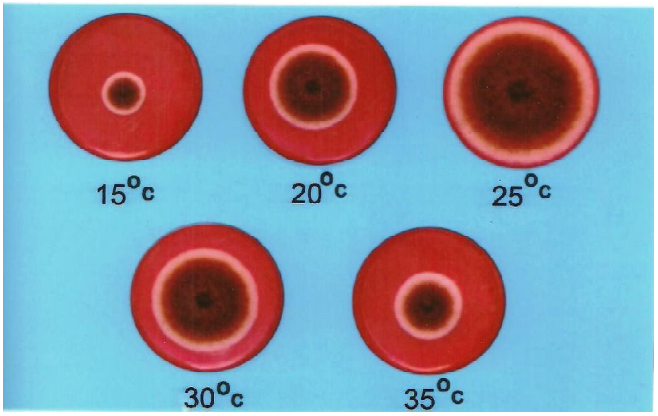


**Fig. 4 :** Effect of relative humidity on mycelial growth and sporulation of *A. alternata* growth and sporulation of *A. alternata*

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