The Andhra Agric. J 59 (2):327-328, 2012

Effect of Temperature, Relative Humidity and Light Intensity on Growth and Sporulation of *Colletotrichum dematium* Causing Blight of Chickpea

Key words : *Colletotrichum dematium*, Light intensity, Relative humidity

Chickpea (*Cicer arietenum* L.) is one of the important pulse crop in India. Chickpea crop is widely grown in the districts of North Karnataka. The chickpea crop is affected by several diseases of which blight caused by *Colletotrichum dematium* is one of the important disease resulting severe yield losses to the chickpea growing farmers. In the present study the optimum conditions for growth and sporulation was studied.

The effect of different temperatures on growth and sporulation of the fungus was studied using Richard's medium. The growth and sporulation of *Colletotrichum dematium* was tested at different temperatures i.e., 20, 25, 27, 30 and 35^{0}C respectively.

The 5 mm discs of well sporulated culture of *Colletotrichum dematium* were inoculated on Richard's agar. The inoculated plates were incubated for ten days and growth and sporulation were recorded after ten days of incubation.

To test optimum relative humidity requirements for the growth and sporulation of the fungus, five relative humidity levels i.e., 80,85,90,95 and 100 per cent were maintained by following method described by Booth (1971). The 5 mm discs of the fungus were inoculated on Richard's agar plates and incubated at different relative humidity levels for 10 days. The fungal discs of 5 mm were removed from each relative humidity level after incubation and placed in 10 ml distilled water in a test tube . The test tubes were shaken well and number of conidia per milliliter of suspension was recorded by using haemocytometer (Purohit, 1995) at each level.

To test the optimum light requirement for growth and sporulation of *Colletotrichum dematium*, the culture plates were inoculated with 5 mm discs of the fungus and subjected to different light intensities i.e., alternate light (12 hr) and darkness (12 hr), total light (24 hr) and total darkness (24 hr).The observations on growth and sporulation were observed ten days after inoculation.

The results of temperature on growth and sporulation of *Colletotrichum dematium* revealed that the maximum growth of the fungus was observed at 27^{0}C (87.00 mm) followed by 30^{0}C (79.75 mm). The least growth of the fungus was observed at 35^{0}C (25.25 mm). Similarly maximum sporulation was observed at 27^{0}C (2.4×10^6 conidia ml^{-1}) followed by 25^{0}C (1.4×10^6 conidia ml^{-1}) and less sporulation was recorded at 35^{0}C (1.6×10^6 conidia ml^{-1}) followed by 20^{0}C (7.8×10^6 conidia ml^{-1}).

The effect of relative humidity on growth and sporulation of *Colletotrichum dematium* (Table 1) showed that the maximum growth and sporulation was observed at 100 per cent relative humidity (89.50 mm and 12.6×10^6 conidia ml^{-1}) followed by 95 per cent (80.50 mm and 11.4×10^6 conidia ml^{-1}). The least growth and sporulation was observed at 80 per cent relative humidity (50.25 mm and 2.4×10^6 conidia ml^{-1})

The results of light intensities on growth and sporulation of *Colletotrichum dematium* showed that the maximum growth and sporulation of 90.00 mm and 24.0×10^6 conidia ml^{-1} was observed in alternate light (12 hr) and darkness (12 hr) followed by continuous light (24 hr) 88.33 mm and 15.6×10^6 conidia ml^{-1}. The minimum growth and sporulation was observed in total darkness (24 hr) 75.00 mm and 5.0×10^6 conidia ml^{-1}.

Singh and Shukla (1986) reported that the maximum sporulation of *Colletotrichum truncatum* causing blackgram anthracnose was found at 28^{0}C and maximum dry mycelia weight was observed between 25-30^{0}C.

Thakur (1992) reported that temperature of 25^{0}C and 90-100 per cent relative humidity was found to be optimum for *Colletotrichum lindemuthianum* causing mungbean anthracnose.

Abhmishra and Om Gupta (1994) reported that maximum radial growth and sporulation of Colletotrichum dematium was observed at 27^{0}Ccompared to 20, 25, and 30^{0}C and relative humidity of 100 per cent supported maximum growth and sporulation at room temperature compared with 80, 85, 90 and 95 per cent. Maximum sporulation occurred with continuous light compared with alternate light and darkness at room temperature (28±2^{0}C)

Table 1.Effect of temperature, relative humidity and light intensity on growth and sporulation of *Colletotrichum dematium* causing blight of chickpea

Parameter	Radial Growth (mm)*	No. of conidia/ml (×10^6) **
Temperature (^{0}C)		
20	44.50	7.8
25	78.50	14.1
27	87.00	24.5
30	79.50	11.1
35	25.25	1.6
S. Em ±	0.921	0.830
C.D at 1%	3.961	2.749
Relative humidity (%)		
80	50.25	5.3
85	71.50	6.4
90	72.50	10.5
95	80.50	11.4
100	89.50	12.6
S. Em ±	0.539	0.604
C.D at 1%	1.812	2.635
Light Intensity (Hr)		
Alternate light (12 hr)	90.00	24.0
and Darkness (12 hr)	83.00	15.6
Continuous light (24 hr)	75.00	5.0
Total Darkness (24 hr)		
S. Em ±	0.284	0.285
C.D at 1%	3.621	2.649

*Mean of three replications ** Mean of five counts

Ashok Kumar *et al*. (1999) reported that frequent heavy rains with moderate temperature (19-25^{0}C) and high relative humidity (> 70%) are favourable for the infection of *Colletotrichum lindemuthianum* causing kidneybean anthracnose.

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(Received on 06.06.2009 and revised on 26.06.2009)