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Effect of Temeperature and P^{H} on Growth of *Alternaria tagetica*, Leaf Blight of Marigold

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ABSTRACT

Marigold (*Tagets erecta*) is one of the most important major floriculture crop in India. The leaf blight of marigold is caused by *Alternaria tagetica* is becoming a common disease on marigold Alternaria blight appeared in mild to severe form in many regions of Maharashtra and sometimes resulting in complete failure of the crop especially during rainy season. The fungal pathogen are greatly influenced by environmental factor therefore the present work undertaken to study the effect of temperature and pH on growth of *Alternaria tagetica.* The effect of temperature and pH were determined by colony diameter method by using different media like potato dextrose agar and oat meal agar medium. It is clearly evident from the result that all the temperature pH tested showed variation in the diameter of colony. The temperature 25°C encouraged better growth of *Alternaria tagetica* as compared to 15°C and 35°C. The result also revealed that pH 6 and 7 encouraged better growth of *Alternaria tagetica* it is concluded from the result that temperature 25°C and pH 6 is optimum temperature and pH for the growth *Alternaria tagetica*.

Key words: Alternaria alternata, pH, Soyabean, Temperature.

INTRODUCTION

Marigold (*Tagetes* L.) is a flowering plant belonging to the family Asteraceae. The name *Tagetes* come from the name of the “Etruscan Tages”. Marigold was first time discovered by the Portuguese in Central America in the 16th century, and is a native of North and South America. The most commonly cultivated varieties of *Tagetes* are African marigold (*Tagetes erecta*) and French marigold (*Tagetes patula*).

In India marigold is mainly cultivated in the states of Karnataka, Madhya Pradesh, Maharashtra, West Bengal, Haryana, Delhi and Himachal Pradesh. In Maharashtra, marigold is cultivated in an area over 3760 hectares with a production of 23820 metric tonnes of flowers (indiastat 2016). Although, the area under marigold cultivation is increasing year after year but overall yield with regard to flower production per unit area is fluctuating because of incidence of diseases in the crop. Different diseases are observed on the marigold among this in recent years, Alternaria blight appeared in mild to severe form in many regions of Maharashtra and sometimes resulting in complete failure of the crop especially during rainy season.

The phyllosphere of plants is a dynamic ecosystem inhabited by specific bacteria, yeasts and fungi. Their activity is related to various interactions between the biotic and abiotic factors of the environment (Thakur and Harsh, 2014). Abiotic factors includes Temprature, pH, Humidity, Light intensity *etc.* whereas biotic factors include pest and other microorganisms, these microorganisms will compete with pathogenic species this phenomenon called antagonistic activity and it has been studied by many researcher (Kumar, 2008; Panwar *et al.*, 2013).

The effect of pH, incubation temperature, light regime and type of culture media on the mycelial growth of *A. alternata* causing leaf blight of noni has been studied in vitro in agar plates and it is found to be sensitive to nutritional and environmental factor and their growth and sporulation are therefore greatly influenced by the composition of the temperature and pH (Hubballi *et al.*, 2010). The present work has therefore undertaken to study effect of these factors on the growth of *Alternaria tagetica* causing leaf blight of marigold.

MATERIALS AND METHODS

Alternaria tagetica was isolated from the infected leaves of marigold. After performing their pathogen city test their culture was maintained on potato dextrose agar medium at 25± 1.C.

Effect of temperature

To study the optimum temperature requirement for the mycelial growth and sporulation of test pathogen, temperatures ranging from 0 to 35°C were studied on PDA medium. Twenty milliliter sterilized PDA was poured in sterilized Petri plates. The Petri plates were inoculated with five 5 mm disc of 7 days old culture of test pathogen as mentioned earlier in 3.4.1.1 and the inoculated plates were separately incubated at 0, 5, 10, 15, 20, 25, 30 and 35°C. Four replications were taken for each temperature level. Observations on the mycelial growth (mm) and spore

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production of test pathogen were recorded after 7 days of incubation.

Effect of P^H

Different pH levels *i.e*. 2, 3, 4, 5, 6, 7, 8 and 9 were evaluated to study the influence of hydrogen ion concentration on the mycelial growth and spore production of test pathogen on PDA. The pH of the media was adjusted by adding 0.10 N HCl/NaOH, with the help of electronic pH meter. Twenty milliliter sterilized PDA was poured in sterilized Petri plates. Petri plates were inoculated with 7 days old culture and incubated at 25 ± 1°C temperature for 7days. Four replications were maintained for each pH level. Observations on the mycelial growth (mm) and spore production of the pathogen were recorded after 7 days of incubation.

RESULTS AND DISCUSSION

Effect of temperature on mycelium growth

Influence of temperatures on the mycelial growth and sporulation of *Alternaria tagetica* were determined on PDA. The inoculated Petri plates with *Alternaria tagetica* were exposed to 0, 5, 10, 15, 20, 25, 30 and 35°C. Observations on the mycelial growth (mm) and sporulation were recorded after seven days of incubation. The data obtained are presented in Table 1.

It is clear from the results that the pathogen could grew well between 20 to 30°C. Significantly highest mycelial growth (63.25 mm) with excellent sporulation was observed at 25°C, which was followed by 30°C (48.50 mm) and 20°C (31.12 mm) with excellent to moderate sporulation, respectively. Lower temperature *i.e.* 15°C (15.75 mm) revealed poor mycelial growth and meager sporulation of *Alternaria tagetica*. Temperatures less than 10°C did not supported mycelial growth and sporulation. It is revealed from the results that 25°C temperature found most suitable for the mycelial growth and sporulation of *Alternaria tagetica* on PDA. Results similar to the present investigation giving best mycelial growth and sporulation of *Alternaria tagetica* at 25°C was observed by Singh *et al*. (2001). Further Singh and Majumdar (2004) recorded highest *Alternaria* fruit rot

Table 1: Effect of temperature on the mycelial growth of *Alternaria tagetica.*

Sr. No.	Temperature	Mycelial growth (mm)	Sporulation
1	0°C	0.00	-
2	5°C	0.00	-
3	10°C	0.00	-
4	15°C	15.75	++
5	20°C	31.12	+++
6	25°C	63.25	++++
7	30°C	48.50	++++
8	35°C	29.87	++
S. Em. ±	0.45		
C.D. at 1%	1.74		
C.V. %	3.82		
-	No spore production	+++	Good spore production
+	Poor spore production	++++	Excellent spore production
++	Moderate spore production		

Table 2: Effect of pH on the mycelial growth and sporulation of *Alternaria tagetica.*

Sr. No.	pH	Mycelial growth (mm)	Sporulation
1	2	0.00	-
2	3	0.00	-
3	4	32.37	++
4	5	48.12	+++
5	6	56.00	++++
6	7	68.00	++++
7	8	64.25	+++
8	9	54.25	+++
S. Em. ±	0.98		
C.D. at 1%	2.88		
C.V. %	4.90		
-	No spore production	+++	Good spore production
+	Poor spore production	++++	Excellent spore production
++	Moderate spore production		

severity at 25°C in pomegranate. Panchal (2008) observed excellent mycelial growth and sporulation of *Alternaria alternata* infecting tomato at 25°C.

Effect of pH on mycelium growth

Eight pH levels were studied to determine the effect of hydrogen ion concentrations on the mycelial growth and sporulation of *Alternaria tagetica* and the results achieved are presented in Table 2. The data presented in Table 2 revealed that significantly highest mycelial growth (68.00 mm) and excellent sporulation was recorded in pH 7 followed by pH 8 (64.25 mm). The alkaline pH supported better mycelial growth than acidic one. However, at pH 2 and 3 pathogen failed to produce mycelial growth. The lower pH levels had detrimental effect on the mycelial growth and sporulation of *Alternaria tagetica*. The results of present investigations are similar to the results obtained by Gaddanakeri *et al*. (1998) recording maximum mycelial growth of *Alternaria alternata* causing blight of turmeric at pH 6.5. Further, Kumar and Choudhary (2006) recorded maximum biomass production of *A. brassicae* and *A. brasssicola* infecting Indian mustard at pH 6.0.

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