



EFFECT OF TEMPERATURE AND MOISTURE CONTENT OF SOIL ON GROWTH OF SOME ISOLATED DEMATIACEOUS FUNGI OF KANPUR

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Abstract:

The effects of temperature and moisture content of soil on the growth of *Chaetomium globosum* and *Chrysosporium tropicum* were investigated. Different temperature regimes of 5°C, 15°C, 25°C, 35°C and 45°C were used to determine the temperature effect on the growth of *C.globosum* and *C.tropicum* was obtained maximum at 25°C and 35°C temperatures. The fungus was also cultured on 20%, 40%, 60%, 80%, and 100% moisture of soil. The *C. globosum* and *C. tropicum* showed maximum growth at 40-60% moisture of the soil.

Keywords: soil, dematiaceous, temperature, moisture content, fungi.

Introduction:

The soil serves as natural reservoir for many micro-organisms such as bacteria, fungi and other organisms. Fungi lives in soil as saprophytically and also are pathogenic. The diversity and growth of fungi is affected by various environmental physical factors such as temperature, pH, light intensity, soil nutrients and soil moisture etc. Dermatophytes are much specialized and important group of organisms that are characterized by black to brown pigmented filaments (hypae). Dematiaceous fungi inhabiting saprophytically in soil and may be pathogenic or non-pathogenic. These fungi are very common and cosmopolitan inhabiting on living and dead organic matter. Many pathogenic agents survive in their specific ecological territory and also specific environmental conditions that are suitable for their growth and life cycle. The growth of dematiaceous fungi is affected by the various environmental physical conditions such as temperature, pH, light intensity and moisture content of soil etc. The physical factors are very crucial for growth and sporulation of pathogenic and non pathogenic fungi. In general, on decreasing of physical factors the growth of fungi is directly affected, at lower and high temperature of the dematiaceous fungi will be reduced but at normal temperature fungal growth is maximum, such results have been reported by Rangaswami et al., 1961. Exceptionally some

dematiaceous fungi could be grow on very low as well as very high temperature. Optimum soil moisture conditions (25% - 65%) must be therefore better for activities and population of the microorganism in soil. The most effective physical factor for growth of fungi is temperature. Fungi can survive in a large range of temperature, but their metabolic activity and growth rate is depend upon the temperature when all other environmental conditions are constant environmental. Several researcher were studied the effect of environmental physical factors on the growth of infectious fungi (Singh and Malik 2004; Kim and Xiao 2005). Similarly, Sharma and Sharma (2009) were studied that *Chrysosporium tropicum* and *Trichophyton mentagrophytes* showed maximum growth at a temperature between 27-31°C.

However, little data is available on the effect of some environmental physical factors on the growth of indoor dematiaceous fungi, the main objective of this present work done is to investigate the effect of temperature and moisture content of soil on the growth of *Chaetomium globosum* and *Chrysosporium tropicum*. This may contribute to increase awareness about these pathogenic dermatophytes indoor habitats of kanpur region.

1. Material And Methods:

2.1 Collection of soil samples: The dust samples were collected from different indoor habitats

(Hospital, Dairy, College library and Tannery) of Kanpur region. The samples were collected from the floor of various indoor habitats in clean, sterile polythene bags brought to the laboratory and stored at room temperature $28\pm 2^{\circ}\text{C}$.

2.2 Isolation, Purification and Identification:

Dematiaceous fungi were isolated by Vanbreuseghem hair-bait technique (1952). Soil were placed in pre-sterile petridishes and moistened with distilled water and baited with autoclaved human hairs. The distilled sterile water gives the moistened conditions for the dematiaceous fungal growth. After 10 days of healthy growth of dematiaceous fungi, the growth is transferred on the Potato Dextrose Agar medium filled sterilised petridishes. After transferring the fungal colony dishes were incubated at $28\pm 2^{\circ}\text{C}$ for 8-10 days. For purification, fungal colony is 2-3 times transferred another dishes. The isolated fungi were observed and identified on the basis of morphological and microscopic characters and available identification key in Botany department of D.G.P.G. College, Kanpur.

Effect of temperature on growth of dematiaceous fungi:

The effect of temperature on the growth of *Chaetomium globosum* and *Chrysosporium tropicum* was assessed in accordance with the methods of Singh and Malik 2004. 6 mm disc was taken from the periphery of 8-10 days old pure colony of both isolated and identified fungus that previously grown on potato dextrose agar medium was placed in the centre of autoclaved petridishes containing Potato Dextrose Agar medium. The inoculated dishes were incubated at 5, 15, 25, 35, and 45°C for 10 days. The growth of both fungi was regularly observed at different time intervals i.e. 2, 4, 6, 8, and 10 days.

Table 1: Effect of temperature on fungal growth

Isolated fungus	Temperature	Growth in diameter(mm)				
		Incubation period (days)				
		2	4	6	8	10
Chaetomium globosum	5°C	0	0	0	0	0
	15°C	0	4	12	23	43
	25°C	6	21	33	45	87
	35°C	14	35	45	51	63
	45°C	0	11	21	32	38
Chrysosporium tropicums	5°C	0	0	0	0	0
	15°C	0	8	21	33	35
	25°C	11	23	46	51	63
	35°C	8	28	38	78	97
	45°C	0	0	8	11	21

Effect of moisture content of soil on growth of dematiaceous fungi:

For the present study, *Chaetomium globosum* and *Chrysosporium tropicum* were taken on the basis of frequent occurrence during the isolation. Moisture content of the soil on the growth and development of dematiaceous fungi were carried out in accordance with the technique of (Kim and Xiao 2005). Take 10 gm sterilized soil to maintain in the soil moisture was incubated in an oven at 105°C for 2 days. After 2 days of incubation, the soil sample was taken and cooled down at $28\pm 2^{\circ}\text{C}$ temperature. Then, maintain the moisture percentage in the soil 20%, 40%, 60%, 80%, 100% then inoculated the test fungus in the soil for 8-10 days. Take 10mg of soil make a soil suspension inoculated in the. The dishes were inoculated and incubated for 10 days at room temperature $28\pm 2^{\circ}\text{C}$ and observed regularly in 2, 4, 6, 8, and 10 days intervals.

Results and Discussion

The result of the effect of different temperature (5°C , 15°C , 25°C , 35°C , and 45°C) on the growth of *Chaetomium globosum* and *Chrysosporium tropicum* are shown in Table 1. All the temperature was examined for the growth of each dematiaceous fungi. However, it was observed that the maximum growth shown at 25°C and 35°C after 6 days of incubation. However, the growth was reduced below 15°C and above 35°C because this temperature did not suitable for the growth of this fungus.

The maximum growth of *C. tropicum* was observed at 60% while 40% supported the least growth. However at 20% and 100% no growth was recorded. *C. globosum* showed maximum growth at 60% and minimum at 20%. No growth was observed at 100%. This fungus also exhibited less growth at 20%.

Table 2: Effect of moisture content of soil on the growth of dematiaceous fungi

Moisture content of soil %	Growth (in mm) of dematiaceous fungi	
	<i>Chrysosporium tropicum</i>	<i>Chaetomium globosum</i>
20	3.67±1.52	5.00±1.80
40	12.00±1.32	17.33±3.03
60	50.33±3.11	55.66±4.95
80	9.33±1.04	13.00±1.77
100	0.00±0.00	0.00±0.00

Temperature and moisture content of soil play a very important role in promoting the growth of fungi (Cochrane, 1963). Generally, the growth temperature for the mostly of fungi is between 25°C to 35°C and above 40°C the growth is poor (Emerson and Cooney, 1964). The researcher reported that the both dematiaceous fungi showed maximum growth at 25-30°C after 6 days incubation which was drastically reduced below 15°C and above 35°C temperature. The maximum growth of both fungus were observed at 40-60% of moisture present in the soil.

Conclusion:

The growth and sporulation of *chaetomium globosum* and *Chrysosporium tropicum* was affected by temperature and moisture content of soil.

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