

Isolation and Identification of Indoor Dematiaceous Fungi of Kanpur (India)

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Abstract

Microorganisms such as fungi are the major component of the soil ecosystem. Fungi live saprophytically in soil, but they also cause diseases in plants, animals, and other organisms. Dematiaceous fungi are a large heterogeneous group of microorganisms that are characterized by a light to dark brown color hyphae and conidia and both. This survey briefly represents the isolation and identification of important dematiaceous fungi from the indoor habitats of Kanpur region. Ninety six dust samples were collected seasonally from different habitats (Hospitals, Dairies, Tanneries, and College libraries) of Kanpur, Uttar Pradesh. A total of 80 samples were found to be positive. A total of 11 genera and 15 species were identified, out of which *Chaetomium globosum* (25%) was found to be the most frequent dematiaceous fungus. *Chrysosporium tropicum* (21.9%) was the second most frequent dematiaceous fungus.

Keywords: Dematiaceous fungi, Indoor habitat, Microorganism, Soil, Dust, Isolation.

Introduction

Soil is the natural ecosystem for microorganisms in which fungi are the constituent of this ecosystem. Fungi live as saprophytes in the soil and are also pathogenic for plants, animals, and other microorganisms. Dematiaceous fungi have a large heterogeneous group of organisms that are characterized by a light to dark brown pigmentation of their hyphal or conidial elements or both. The dematiaceous fungi are widely distributed among the ascomycetes, basidiomycetes, zygomycetes and the deuteromycetes and are considered to be saprophytes living in soil and vegetative material. Many species of dematiaceous fungi cause morbidity and mortality in expanding immunocompromised patient populations. This group includes species of *Alternaria*, *Curvularia*, and *Cladosporium* which are phytopathogens causing rot and seed damage and producing a number of phytotoxic metabolites that also affect mammalian cells. Several species of dematiaceous fungi cause chronic local infection of subcutaneous tissues. Many dematiaceous fungi have been isolated from various habitats. The first discovered fungus, *Cladosporium bantiana*, was reported from Virginia (United States) from tree bark (Dixon, et al., 1977). These fungi had previously been isolated from soil in Panama (Klite, et al., 1968). Dematiaceous fungi have also been isolated from college greenhouse by Dixon (1982) and also reported from Mediterranean marbles and limestones by (Sterfling et al., 1997).

Kanpur is a very large populated and much-polluted city. There are many pathogenic microbes that grow in the soil and affect plants, animals and humans also. Soil can become a potential source of infection for humans and animals (Mantovani, 1978, Filipello, 1986). In the last few years, many researches have represented the isolation of dematiaceous fungi all over the world. In the current era, most people generally go to Dairies, College libraries, hospitals and sometimes tanneries also for their requirements, but they are unaware of the infection of the Dematiaceous fungi of indoor dust. The aim of the study is to highlight the growth of pathogenic dematiaceous fungi and the factors that affect their growth. Soil can become a potential source of infection for humans and animals (Mantovani, 1978, Filipello, 1986).

Objective of the Study

The present study aims to isolate and identify dematiaceous fungi from dust of the various places (dairy, hospitals, college library, and tannery etc).

Material and Methods

A total of 96 dust samples were collected from different indoor habitats of the Kanpur region such as Hospitals, Tanneries, College Libraries, and Dairies during the years 2017-18. The dust samples were stored at room temperature in the laboratory that was collected in sterile polythene bags. Isolation of the Dematiaceous fungi was done by the hair bait technique of Vanbreuseghem (1952). The indoor floor dust samples were put into pre-sterilized 90mm Petri dishes. These samples were baited with previously autoclaved human hair that was cut into pieces of 1cm and used as baits and moistened with sterilized water, and incubated at 28±2 degree centigrade. All samples were examined every day. After 8-10 days, when the colony of fungus was seen, it was transferred into a Petri dish which was half filled with Sabouraud's dextrose agar medium. The dishes were incubated at room temperature (28±2 degree centigrade) for 15-20 days and examined regularly on alternate days after 8 days of incubation.



Akanksha Singh Tomar

Research scholar
Dept. of Botany
D.G.P.G.College,
Kanpur, U.P., India



Vandana Nigam

Associate Professor
Dept. of Botany,
D.G.P.G.College,
Kanpur, U.P., India

Results and Discussion

The results are shown in the table. There were only 80 samples that produced dematiaceous fungi out of 96 samples, meaning a total of 83.3% of samples were found to be positive. 11 genus and 15 species were identified among these dematiaceous fungi: *Chaetomium globosum* (25%) was the most frequent on the basis of presence while *Chrysosporium tropicum* (21.9%) was the next most dominant species. The occurrence of other genus was *Fusarium oxysporum* (6.3%), *Alternaria alternata* (9.4%), *Alternaria solani* (1.04%), *Microsporium gypseum* (18.8%), *Chrysosporium indicium* (10.4%), *Chrysosporium keratinophilum* (2.1%), *Curvularia Lunata* (8.3%), *Curvularia clavata* (4.2%), *Epicoccum nigrum* (9.4%), *Cladosporium sp.* (8.3%), *Bipolaris spicifera* (7.3%), *Ulocladium chartarum* (2.1%), *Phialophora parasitica* (2.1%), etc.

The maximum genera were isolated from the indoor dust samples of Dairies and Tanneries. These identified genera have previously been reported from various parts of Kanpur. *Chaetomium globosum* was isolated from all indoor habitats (Hospital, Tannery, Dairy and College library), and *Chrysosporium* genus were also isolates from the indoor dust of the Kanpur region. The maximum genera were isolated from the indoor dust samples of Dairies and Tanneries. These identified genera have previously been reported from various parts of Kanpur. *Chaetomium globosum* was isolated from all indoor habitats (Hospital, Tannery, Dairy and College library), and *Chrysosporium* genus was also isolated from the indoor dust of the Kanpur region.

Dematiaceous Fungi Isolated From Various Indoor Habitats

Source of soil samples	Hospital	Tannery	Dairy	College Library	Total	Percent (%) Distribution
No. of samples examined	24	24	24	24	96	
No. of samples positive	22	19	21	18	80	
Percent (%) occurrence	91.6	79.16	87.5	75	83.3	
Isolated Fungi						
<i>Chaetomium globosum</i>	4	3	8	9	24	25
<i>Fusarium oxysporum</i>	-	4	2	-	6	6.3
<i>Alternaria alternata</i>	-	3	1	5	9	9.4
<i>A. Solani</i>	-	-	-	1	1	1.04
<i>Microsporium gypseum</i>	8	7	3	-	28	18.8
<i>Chrysosporium tropicum</i>	9	6	4	3	21	21.9
<i>C. indicum</i>	2	4	4	-	10	10.4
<i>C. keratinophilum</i>	-	1	1	-	2	2.1
<i>Curvularia lunata</i>	-	1	3	4	8	8.3
<i>C. clavate</i>	-	2	2	-	4	4.2
<i>Epicoccum nigrum</i>	-	2	4	3	9	9.4
<i>Cladosporium sp.</i>	3	2	2	1	8	8.3

Bipolaris spicifera	-	2	3	2	7	7.3
Ulocladium chartarum	-	-	1	1	2	2.1
Phialophora parasitica	-	1	1	-	2	2.1

Conclusion

Eighty three dust samples were collected from indoor habitats of Kanpur and for occurrence of dematiaceous fungi. From the positive eighty sample, a total of 11 genera and 15 species were isolated. A total of 83.3% samples were found to be positive for dematiaceous fungi. Among these fungal species, *Chaetomium globosum* (25%) was the most frequent while *Chrysosporium tropicum* was the next most dominant species (21.9%).

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