

EXISTENCE OF KERATINOPHILIC FUNGI AND RELATED DERMATOPHYTES, THEIR DISTRIBUTION IN WASTE HABITATS OF KANPUR (INDIA)

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Ninety three soil samples were collected from different waste habitats of Kanpur and examined for the occurrence of keratinophilic fungi and related dermatophytes. From the positive 83 samples, a total of 5 genera and 13 species were isolated. A total of 89.25% samples were found to be positive for keratinophilic fungi. Among these fungal species, *Microsporum gypseum* (24.73%) was the most dominant while *Chrysosporium queenslandicum* was next most frequent isolated species (20.43%).

Keywords : Dermatophyte; Keratinophilic fungi; Waste habitats.

Introduction

Keratinophilic fungi are a group of fungi that colonize various keratinous substrates and degrade them to components of low molecular weight. Keratin is a refractory protein polymer and is the main constituent of epidermal skin, hair, feather, horn, nail etc. In nature, it is degraded by keratinophilic fungi that are present in the environment and survive on animal debris. Keratinophilic fungi, which cause diseases of skin and its appendages, are called dermatophytes. Keratinophilic fungi are potentially pathogenic to man and animals. These genera include *Chrysosporium*, *Trichophyton*, *Epidermophyton* and *Microsporum*. The rapid urbanization and industrialization has increased the amount of solid waste and utilization of these waste is very important for government economy and natural balance. Habitats under solid waste are source of various pathogenic fungi including keratinofers. These fungi have been isolated from Indian soil by various investigators from different habitats viz. poultry farms¹, water sediments², public parks and soils / floor dust of primary school³, lake side soils⁴, house dust⁵ and salt pans⁶. Kanpur is an industrial city with a large population living under unhygienic conditions. The present investigation was, therefore, undertaken to survey the natural occurrence and distribution of keratinophilic fungi in soil collected from various waste habitats of Kanpur.

Material and Methods

A total of 93 soil samples were collected from different waste habitats during 2006 and 2007. Samples were collected in sterile polythene bags and brought to the

laboratory and stored at room temperature. The keratinophilic fungi were isolated by hair baiting technique of Vanbreuseghem⁷. Sterile petridishes were half filled with the soil samples and moistened with sterile water and baited by burying sterile poultry feather, peacock feather, human hair, human nail, buffalo horn, buffalo hair in the soil. These dishes were incubated at room temperature and examined daily after 6 days. After observing the growth, isolates were cultured on Sabouraud's dextrose agar medium. The plates were incubated in the moist chamber at $28 \pm 2^\circ \text{C}$ for 20 to 25 days and examined periodically after 6 days of incubation.

Results and Discussion

The results are presented in Table 1. Out of 93 samples, only 83 yielded keratinophilic fungi and related dermatophytes. Five genera and 13 species were isolated. A total of 89.25% samples were found to be positive for keratinophilic fungi. Among these fungal species, *Microsporum gypseum* (24.73%) was the most dominant on the basis of occurrence, while *Chrysosporium queenslandicum* was next most frequent species isolated (20.43%). Other genera recovered were *Chrysosporium georgii* (1.08%), *Chrysosporium indicum* (15.05%), *Chrysosporium keratinophilum* (6.45%), *Chrysosporium pannicola* (2.15%), *Chrysosporium tropicum* (4.30%), *Chrysosporium* sp1 (1.08%), *Chrysosporium* sp2 (1.08%), *Acremonium* sp1 (19.35%), *Acremonium* sp2 (7.53%), *Arthoderma cuniculii* (1.08%) and *Malbranchea* sp. (10.75%).

Keratinophilic fungi and related dermatophytes are important ecologically and play a significant role in

Table 1. Distribution of keratinophilic fungi and related dermatophytes in waste habitats of Kanpur .

Source of soil samples	Municipal waste	Hospital waste	Aquatic waste	Total	Percentage distribution
Number of sample examined	36	24	33	93	
Number of sample positive	32	21	30	83	
Percent occurrence	88.89	87.5	90.90	89.25	
Fungi recorded					
<i>Acremonium</i> sp.1	8*	4	6	18	19.35
<i>Acremonium</i> sp.2	3	2	2	7	7.53
<i>Arthroderma cuniculi</i>	1	-	-	1	1.08
<i>Chrysosporium georgii</i>	-	-	1	1	1.08
<i>C. indicum</i>	6	5	3	14	15.05
<i>C. keratinophilum</i>	4	2	-	6	6.45
<i>C. pannicola</i>	2	-	-	2	2.15
<i>C. queenslandicum</i>	9	5	5	19	20.43
<i>C. tropicum</i>	-	2	2	4	4.30
<i>Chrysosporium</i> sp.1	1	-	-	1	1.08
<i>Chrysosporium</i> sp.2	-	-	1	1	1.08
<i>Malbranchea</i> sp.	3	2	5	10	10.75
<i>Microsporum gypseum</i>	11	7	5	23	24.73

* indicates number of the isolates

- indicates absence of the keratinophilic fungi

the natural degradation of keratinized residue. These fungi were previously reported from various parts. *Acremonium* was isolated from pot soil, garden soil and zoological park soil⁸. *Acremonium* was also reported from house dust⁹. *Arthroderma cuniculi* was isolated in soil samples taken from Yemen Arab Republic¹⁰. During this study, *Chrysosporium* was isolated from all the habitats. *Chrysosporium indicum* was isolated from soil of crop field, garden and zoological park¹¹. *Chrysosporium keratinophilum* was isolated from house dust⁵ and garden and picnic spot soil¹². *Chrysosporium pannicola* was reported first time from house dust in India⁵.

Chrysosporium tropicum was reported from garden, cultivated field and river sand¹³. *Chrysosporium queenslandicum* reported from poultry farm¹. *Microsporum gypseum* isolated from garden, roadsides, hospital dust, play ground, and municipal waste¹⁴. *Malbranchea* has been reported from Indian soil¹⁵. These keratinophilic fungi were also reported from other parts of India^{16,17}.

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