

Degradation of Keratinous Substrate by Fungi from Soils of Ujjaini Madhya Pradesh

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Abstract— Keratinophilic fungi are ecologically important and involved in the breakdown of keratinaceous substrates. Keratinophilic fungi were investigated in 32 samples of soils taken from Mahakal temple in Ujjain by hair-baiting technique. Fungal growth appearing on the keratin baits were examined and cultured on mycological media and identified on the basis of cultural and morphological characteristics with the help of standard manuals. Twenty seven (84.3%) samples were positive. *Chrysosporium pannicola*, *Microsporum gypsum*, *Chrysosporium indicum*, *Chrysosporium sp.*, etc. are some among the isolates. This study is the first of its kind in Malwa region (M.P.). A high incidence of keratinophilic fungi in soils of Ujjain is a noteworthy finding of public health and environmental significance.

Keywords—Keratinophilic fungi, Keratin, Hair bait technique

I. INTRODUCTION

The soil represents the main reservoir of fungi. Fungi present in the soil were keratinophilic (keratin loving) and some keratinolytic (keratin digesting). Keratinophilic fungi are ecologically important and involved in the breakdown of keratinaceous substrates. They love to grow and reproduce on keratin materials such as hairs, nails, feathers, wool, horn, hooves, skin, etc¹. These belong to hyphomycetes and several other taxonomic groups.

Keratinolytic fungi are a group of microorganisms that are able to degrade keratin remnants in environment and are pathogenic to humans and animals. They utilize keratin as carbon source².

Information on the prevalence of keratinophilic fungi in Malwa region (M. P.) is scanty. The occurrence of keratinophilic fungi in soils of Ujjain has not been investigated previously.

II. MATERIALS AND METHODS

Sample collection: In this study, 32 soil samples were collected from different places of Mahakal temple in Ujjain (M.P.) India. The soil samples were collected from the surface whose deepness did not exceed 4–6cm by using spatula. In doing so, 500 grams of soil was collected in sterile polyethylene bags. Each bag was tightly packed and labelled indicating the place and date of collection. These samples were brought to laboratory for further processing. Various baits (hairs, wool, nails, horn and

feathers) were also collected from various sources and stored in plastic bags.

Hair-baiting technique: For the isolation of keratinophilic fungi, the Vanbreuseghem³ method was used. For this, keratinous substances from each sample were aseptically scattered on the top of each soil sample in sterile Petri dish and provide moistened condition (in duplicates) and incubated at 28°C ±2°C for one month and examined daily for fungal growth. The moulds which appear on the bait fragments (figure-2) were transferred to the surface of Sabouraud's dextrose agar.

(Himedia) with chloramphenicol (50mg/l) and cycloheximide (actidione 500 mg/l). The Petriplates were incubated at 28°C for 7-10 days. These fungi were identified based on the standard monographs⁴⁻⁹.

III. RESULTS AND DISCUSSION

32 soil samples were screened for the prevalence of keratinophilic fungi. Out of which 27 soil samples (84.3%) were positive for fungal growth. The result of prevalence of keratinophilic fungi is shown in table-1 and figure-1. *Chrysosporium pannicola* was the most frequently recovered species being present in 28% of the soils of Mahakal temple. *Chrysosporium* species were also earlier reported from Indian soils¹⁰⁻¹⁷. *Microsporum gypsum* (21%) was the next most frequently isolated species. This fungi is a common geophilic dermatophyte widely distributed in soils globally and causes ringworm of the scalp and glabrous skin in human and animals¹⁸. *Chrysosporium indicum* (14%), *Trichophyton* (9%),

Chrysosporium sp. (6%), *Aspergillus niger* (6%), etc. are some among the isolates.

As Ujjain is a holy place, many pilgrims come to visit the temples especially Mahakal (Lord Shiva) temple. The high prevalence of keratinophilic fungi from these soils explain that, hair of human/ animals and feather from birds which come to the soil either as dead or dropped off, serves as substrates and are subjected to microbial decomposition¹⁹.

Table no.-1 Occurrence of Keratinophilic Fungi

S. No.	Fungus name	%
1.	<i>Chrysosporium pannicola</i>	28
2.	<i>Microsporium gypseum</i>	21
3.	<i>Chrysosporium indicum</i>	14
4.	<i>Trichophyton</i> sp.	9
5.	<i>Aspergillus niger</i>	6
6.	<i>Chrysosporium</i> sp.	6

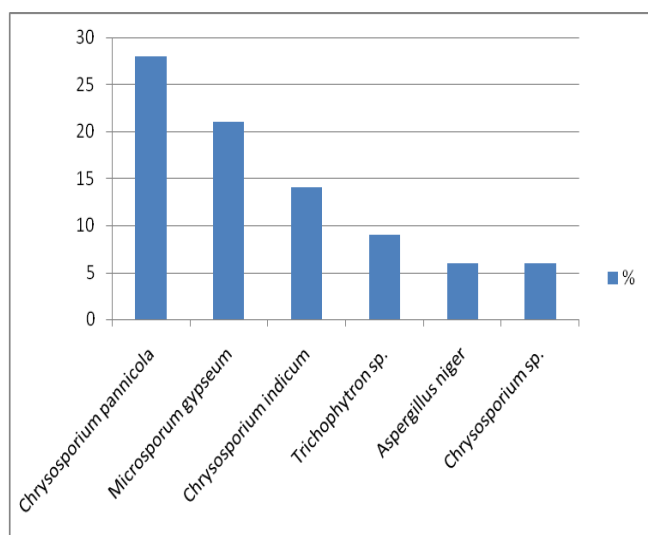
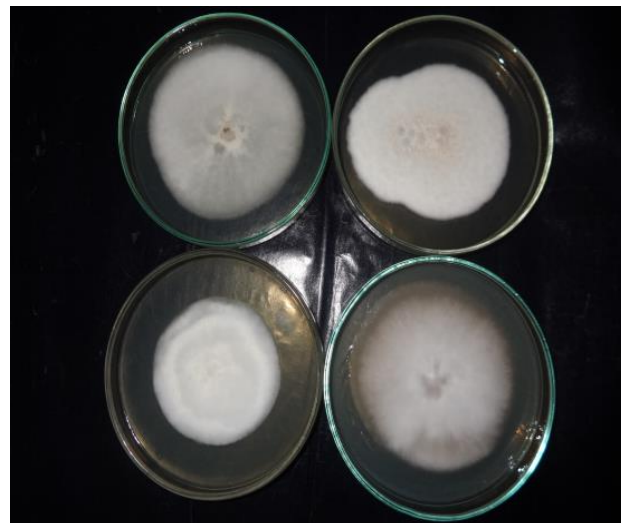


Figure-1: Occurrence of keratinophilic fungi



A- Hair Bait Techniques



B- Keratinophilic Fungi on plate

Figure-2: Growth of Keratinophilic fungi

IV. CONCLUSION

This study is the first of its kind in Malwa region (M.P.). It is clear from present investigation that soils of Mahakal are ideal environment for the keratinophilic fungi. This could be attributed to the high organic debris and keratinous substrates present in these soils. A high incidence of keratinophilic fungi in soils of Ujjain is a noteworthy finding of public health and environmental significance. Thus these fungi which are human/ animal pathogens could be considered as bioindicators of environmental pollution with keratinous substrate and can pose risk of human and animal mycoses.

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