



## Isolation of Keratinophilic Fungi from Unexplored Area of Madhya Pradesh

Archana Kulkarni<sup>1</sup>, Piyusha Agrawal<sup>2</sup>, Jain P.C.<sup>3</sup>

1 Dharampeth M.P Deo Memorial Science College Nagpur

archanakulkarni62@yahoo.com

2, 3 Department of Applied Microbiology and Biotechnology,

Dr. H. S. Gour University Sagar (M.P.)

E-mail. drPiyushagarg@rediffmail.com

### Abstract:

26 soil samples from various localities (poultry farm, cattle farm, saloon, garden and road side) were examined for the presence of keratinophilic fungi. 16 soil samples were found positive for the occurrence of keratinophilic fungi. 18 dermatophytic and non dermatophytic fungi have been isolated by using Keratin Bait Technique. The preponderant fungal species isolated were of genus *Chrysosporium* and *Aspergillus* however species of *Fusarium*, *Malbranchea*, *Microsporum*, *Curvularia* and *Scytalidium* were also isolated. Higher number of isolates was recovered from poultry farm and cattle farm soils (*i.e.* 6 and 7 respectively) as compared to the other habitats.

### Keywords:

Keratinophilic fungi, poultry farm soil; cattle farm soil, *Chrysosporium*, *Microsporum*.

### Introduction:

Keratinophilic fungi represent a group of moulds loving keratin protein and are reported to utilize keratin as sole source of carbon and nitrogen. Several studies on occurrence of keratinophilic fungi have shown that the frequency of occurrence of these fungi in a given soil depends on the availability of keratinic material of that soil. Therefore occurrence and distribution of keratinophilic fungi was studied in a wide range of habitats such as poultry farm soil, cattle farm soils, road side soil, water banks of glaciers, sewage sludge, farm yards, public parks, lake side soil, crop fields, municipal land field etc.

Deshmukh and Agrawal (1998) isolated keratinophilic fungi from crop fields as they are rich in keratinic substances originating from periodic shedding or droppings of human hair, rodents and animal hair etc. These fungi were also isolated from densely populated areas of Uttar- Pradesh (Jain *et al.*, 1985). Keratinophilic fungi were also isolated from soils of forest and farmyards by Moallaei *et al.*, (2006). They reported *Anixiopsis stercoraria* as a most prevalent and dominant keratinophilic fungus. Keratinophilic fungi and selected dermatophytes have also been isolated from the water bank of glaciers of the Kashmir valley (Deshmukh, 2002a). Ghosh and Bhatt (2000) reported rich flora of keratinophilic fungi in the Chilka- Lake side soils. Investigations have also been made on keratinophilic fungi from free-living Indian birds





(Pugh, 1966b; Sur and Ghosh, 1980; Dixit and Kushwaha, 1991a; Sarangi and Ghosh, 1991). Similarly, Rees (1967) reported isolation of these fungi from feathers of domestic fowl.

In the present study, an attempt has been made to determine the prevalence of keratinophilic fungi and related dermatophytes in the soils of different localities of Madhya Pradesh and to isolate potential fungi that can colonize and effectively degrade feather keratin.

## **Material and methods:**

The details of surveyed area, materials and methods used in present study are as follows:

### **(A) Surveyed area and collection of soil samples**

Soil samples were collected from various localities of Bhopal district of Madhya Pradesh. The soil samples from above habitats were collected randomly from the superficial soil layer, depth not exceeding 2" to 3" with the help of sterile spoons and kept in sterile polythene bags. They were brought to the laboratory and kept at 15 °C temperature until processed.

### **(B) Preparation of keratinic baits**

Hen feathers were used as keratinic baits for the isolation of keratinophilic fungi.

### **(C) Isolation of keratinophilic fungi**

Isolation of keratinophilic fungi from the soil samples was done by using "Keratin Bait Technique" (Vanbreuseghem, 1952) using hen feathers as keratin baits.

### **(D) Purification and identification of the isolates**

The isolated fungi were tested for the purity of their cultures. After purification, isolates were maintained on Sabouraud's Dextrose Agar slants at 4° C. For identification of fungi, these were subcultured on Sabouraud's Dextrose Agar medium in Petri plates and allowed to grow and sporulate. On the basis of their colonial characters and micro measurements of mycelium, spore and other fruiting structures, fungi were identified with the help of available literature in the Department of Applied Microbiology and Biotechnology and JawaharLal Nehru Central Library, Dr. H.S. Gour Vishwavidyalaya, Sagar (Domsch and Gams, 1980; Onions *et al.*, 1981; Larone, 2002).

## **Result and Discussion:**

The result of isolation of keratinophilic fungi from the soils of Bhopal (M.P.) is given in Table 1. A total of 26 soil samples collected from Bhopal were examined. Out of this, 16 were found positive. These include 4 from poultry farm, 5 from cattle farm, 4 from garden soil, 2 from saloon soil and 1 from road side soil. In all 18 fungal isolates were isolated from soils of Bhopal (M.P.).





Amongst the soil samples collected from various habitats, samples of cattle farm soil yielded maximum number of fungi (Table 1). From the soil samples of Bhopal, 4 isolates of each genus *Chrysosporium* and *Aspergillus* were isolated. Prevalence of these species was also recorded from different habitats by several workers. Deshmukh and Agrawal (1998) recorded species of genus *Chrysosporium* from the plains and hilly areas of Jammu and Kashmir and Caretta and Piontelli (1977) from Antarctic region having a temperature of 4°C. Appearance of certain species of *Aspergilli* on keratin baitshas been recorded during isolation studies. Previously, Abdel-Malleket *al.*(1989) isolated *Aspergillus* and *Penicillium* as most frequent genera from soils baited with keratinic substrates while Al-Musallam (1990) isolated *A. fumigatus* and *A. flavus* from animal wool.

Three isolates of *Microsporium gypseum* including 1 from poultry farm and 2 from cattle farm soils were recorded during present survey. Moubahser *et al.*,(1992) isolated *M. gypseum* from hair and wool while Battelliet *al.* (1978) suggested occurrence of this species in the sites of animal concentration or soil rich in organic contents. Jain *et al.* (1988) isolated *M. gypseum* from coastal habitats of Goa (India).

The genus *Fusarium* is a common inhabitant of soil. In all three isolates of *Fusarium* were isolated. They represent 1 isolate of each *F. moniliforme*, *F. solani* and *Fusarium* sp. Similarly, Kaul and Sumbali (2000) isolated *F. moniliforme* from feathers of birds. 1 isolate of each belonging to genus *Scytalidium*, *Malbranchea*, *Curvularia* and *Penicillium* was recorded. Jain (1983) also isolated *Malbranchea aurantiaca* from soils of Madhya Pradesh and Uttar Pradesh. Deshmukh (1999, 2004) isolated *Malbranchea* species from the soils of Mumbai and Himachal Pradesh, India.

**Table 1:** Distribution of keratinophilic and saprophytic fungi in different types of soils of Bhopal (M.P.)

Sources of soil samples	Poultry farm	Cattle farm	Garden soil	Saloon soil	Road side	Total
<b>No. of soil samples examined</b>	6	7	6	3	4	26
<b>No. of positive samples</b>	4	5	4	2	1	16
<b>Percentage of positive Samples</b>	66.7	71.4	66.7	66.6	25.0	61.5
<b>Represented species</b>						
<i>Aspergillus flavus</i> C015	-	1	-	-	-	1
<i>Aspergillus flavus</i> P021	1	-	-	-	-	1
<i>Aspergillus niger</i> P018	1	-	-	-	-	1
<i>Aspergillus niger</i> R004	-	-	-	-	1	1
<i>Chrysosporium queenslandicum</i> P007	1	-	-	-	-	1
<i>Chrysosporium tropicum</i> C001	-	1	-	-	-	1
<i>Chrysosporium tropicum</i> P006	1	-	-	-	-	1
<i>Chrysosporium tropicum</i> S002	-	-	-	1	-	1





<i>Curvulariasp.</i> C020	-	1	-	-	-	1
<i>Fusariummoniliforme</i> S007	-	-	-	1	-	1
<i>Fusariumsolani</i> C011	-	1	-	-	-	1
<i>Fusariumsp.</i> C012	-	1	-	-	-	1
<i>Malbrancheafulva</i> G010	-	-	1	-	-	1
<i>Microsporumgypseum</i> C005	-	1	-	-	-	1
<i>Microsporumgypseum</i> C006	-	1	-	-	-	1
<i>Microsporumgypseum</i> P008	1	-	-	-	-	1
<i>Penicilliumcanescence</i> R007	-	-	-	-	1	1
<i>Scytalidiumsp.</i> P017	1	-	-	-	-	1
<b>Total</b>	<b>6</b>	<b>7</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>18</b>

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