

THE DISTRIBUTION OF KERATINOPHILIC FUNGI IN RELATION TO pH OF SOIL

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Screening of 70 soil samples of different habitats like garden, nursery, farm house, vegetable market, cow habitat, buffalo habitat, dog habitat and house dust from different area of Jaipur was done for keratinophilic fungi in relation to soil pH. A total of 97 isolates of keratinophilic and related fungi distributed in 12 genera and 15 species were isolated. The range of soil pH varies between 6 to 10.5. Most of fungi recorded from soil containing 6.5 to 7.5 pH. One isolate *Fusarium moniliforme* was also isolated at 3pH. *Epidermophyton floccosum* was isolated for the first time from Indian soil at pH 6.5 to 7.0. One isolate each, of *Trichophyton terrestre* and *Aspergillus fumigatus* and two isolates of *Nocardia* sp. were isolated from highly alkaline soil at pH 10.5 from animal habitats.

Keywords : Dermatophyte; Habitats; Keratinophilic fungi.

Introduction

Keratinophilic fungi are generally considered as soil saprophytes^{1,2}. Soil that is rich in keratinous material is most conducive for the growth and occurrence of keratinophilic fungi. The majority of dermatophytes can live saprophytically and every keratinophilic fungi can be considered as a potential source. The species of keratinophilic fungal group have been divided into three categories according to their natural habitats. Anthropophilic, when human being are the natural hosts; Zoophilic, when a variety of animals act as natural hosts; Geophilic, when the soil is the natural habitat. Most of the keratinophilic fungi are not dermatophytes but soil inhabitants. They occur on cornified debris in the soil and degrade keratin and keratinous material. Therefore, they play an important ecological role in decomposing such residue.

H-ion concentration of any soil plays an immense role in determining the microflora in it. Keratinophilic fungi mostly preferred slightly acidic to slightly alkaline soil. Gupta and Garg³ isolated the keratinophilic fungi from Meerut in relation to soil pH. Bhadauria and Sharma⁴ studied the distribution of keratinophilic fungi in soil according to the soil pH of habitat. Most of the fungi were reported within the pH range 6.5 to 8.0.

The present investigation described the occurrence of keratinophilic fungi from

different area of Jaipur district in relation to soil pH.

Materials and Methods

Seventy soil samples were collected from different habitats like garden soil, nursery soil, farm house, cow habitat, buffalo habitat, dog habitat, vegetable market and house dust of Jaipur. To. Ka. Va. hair baiting technique⁵ was followed for isolating the fungi.

For this purpose a sufficient amount of soil (25 gm) was taken in a separate sterilized petriplate from each sample. Sterilized distilled water was added to provide moisture to the soil. Bits of sterilized human hair and animal hair (cow, buffalo, dog) were used as baits. The hair were scattered uniformly only on wet soil. Each petriplate was separately labeled indicating the date, site of collection and type of bait, etc. Each petriplate was incubated at 28±2°C for 3-4 weeks in the culture room. Fungal growth, if any on the hair baits was observed periodically.

Metzer's digital pH meter was used to detect the pH of soil solutions. For this purpose, a small amount of soil (1 gm) was shaken with double distilled water (5 ml) and the mixture was allowed to stand for about 30 minutes. Electrode was inserted in the soil solution and reading was noted. This procedure was followed for each soil sample.

Results and Discussion

Out of 70 samples examined from different

Table 1. Hydrogen ion concentration (pH) and fungi isolated from soil samples.

No. of soil samples examined	pH of Soil Samples													Total			
	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0		9.5	10.0	10.5
1	-	-	-	-	-	-	2	9	22	10	7	2	5	5	1	6	70
1	-	-	-	-	-	-	1	8	18	8	6	2	5	3	1	5	58
Species																	
<i>Chrysosporium tropicum</i>	-	-	-	-	-	-	-	3	12	3	3	1	3	1	-	-	26
<i>C. indicum</i>	-	-	-	-	-	-	-	1	1	-	1	-	-	1	-	-	4
<i>Trichophyton simii</i>	-	-	-	-	-	-	-	1	-	-	2	1	-	-	-	-	4
<i>T. mentagro phytes</i>	-	-	-	-	-	-	-	-	1	1	1	-	-	1	-	-	4
<i>T. terrestre</i>	-	-	-	-	-	-	1	1	6	3	-	1	1	2	-	1	16
<i>Gymnoascus reessii</i>	-	-	-	-	-	-	2	1	1	-	-	-	-	-	-	-	6
<i>Epidermophyton floccosum</i>	-	-	-	-	-	-	2	1	1	-	-	-	-	-	-	-	3
<i>Histioplasma capsulatum</i>	-	-	-	-	-	-	1	1	1	1	-	-	1	-	-	-	4
<i>Aspergillus fumigatus</i>	-	-	-	-	-	-	2	2	2	1	2	-	-	1	1	1	10
<i>Fusarium moniliforme</i>	1	-	-	-	-	-	-	-	4	2	-	-	-	1	-	-	8
<i>Drechslera</i> sp.	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
<i>Curvularia</i> sp.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
<i>Monilia</i> sp.	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2
<i>Torula</i> sp.	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	2
<i>Nocardia</i> sp.	-	-	-	-	-	-	-	1	1	1	-	-	1	-	-	2	6

habitats of Jaipur by using different hair baits, 58 samples were found positive in fungal growth. A total of 97 isolates of keratinophilic and related fungi distributed in 12 general and 15 species were isolated. Data presented in Table 1 shows that keratinophilic fungi mostly preferred slightly acidic to alkaline soil. In the present study, most of the fungi were obtained from natural soil. Buchvald *et al*⁶. have also observed an increase in the number of keratinophilic species isolated from surface soil with an increase in the pH from 6.4 to 7.8.

Chryso sporium tropicum, *C. indicum*, *Trichophyton terrestre* and *Aspergillus fumigatus* mostly preferred slightly acidic to highly alkaline soil (pH ranging from 6.5 to 9.5). *Aspergillus fumigatus*, *T. terrestre* and *Nocardia* sp. were also reported from 10.5 pH level from animal habitat soil. *Nocardia* sp. was isolated for the first time from soil in Jaipur district and was found to prefer pH 6.5 to 10.5. Its higher incidence was observed in alkaline soil of animal habitat (10.5 pH).

Gupta and Garg³ studied the keratinophilic fungi in 40 soil samples collected from Meerut with particular reference to soil pH and found that the frequency of occurrence to keratinophilic fungi was higher in alkaline soils.

According to Bhadauria and Sharma⁴, keratinophilic fungi preferred a pH range of 6.5 to 8.0 and alkaline soil (pH 9) favoured good growth in the case of *T. terretrre*.

Gymnoscus reessii preferred slightly acidic to slightly alkaline soil ranging from 6.5 to 7.5, but mostly obtained from neutral soil. According to Sharma⁷, *G. reessii* favoured slightly acidic (6.0-6.5 pH) or slightly alkaline soil (7.5-8.0). These results also support our present findings.

No keratinophilic fungi except *Fusarium moniliforme* was obtained from highly acidic soil up to pH level 5.5. *F. moniliforme* was the only species isolated from highly acidic soil (pH 3). In earlier studies Meinhof *et al*⁸, Male⁹ and Kaben¹⁰ had taken samples of acidic and alkaline soils and found that strongly acidic soils were mostly a poorer source of keratinophilic fungi. Thus, our present findings are in agreement with their results.

Iyer and Williamson¹¹ studied the prevalence of keratinophilic flora in relation to soil pH and found that keratinophilic fungi preferred less acidic to less alkaline soils (pH 6.5-7.5).

Epidermophyton floccosum favoured the less acidic to neutral soil whereas *Histoplasma capsulatum* was mostly isolated from slightly acidic to alkaline soil (pH ranging from 6.5 to 7.5). One isolate of *H. capsulatum* was also reported from alkaline soil (pH 9).

Drechslera sp. was isolated only from alkaline soil whereas *Curvalaria* sp. and *Monilia* sp. were isolated from neutral soil. *Torula* sp. preferred neutral to slightly alkaline soil.

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