

Keratinophilic fungi from Nigerian soil

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Abstract

During a survey of keratinophilic fungi in Nigerian soil samples, twelve species of fungi were isolated. These included *Chrysosporium keratinophilum*, *C. tropicum*, *Curvularia lunata*, *Microsporum audouinii*, *M. canis*, *M. fulvum*, *M. gypseum*, *M. vanbreuseghemii*, *Trichophyton ajelloi*, *T. mentagrophytes*, *T. soudanense* and *T. yaoundei*. These keratinophilic fungi had a higher incidence by occurrence of individual species during the rainy season (May–October) than the dry season (November–April).

Introduction

Vanbreuseghem [12] described the use of a hair-baiting technique for the isolation of keratinophilic fungi. Since then a number of reports have been published on the isolation of keratinophilic fungi throughout the world.

The African reports include those of Ajello [1] on soil as a natural reservoir for human pathogenic fungi; Al-Doory & Kalter [2] who isolated *Histoplasma duboisii* and keratinophilic fungi from soils of Kenya and Tanzania, and Al-Doory [3] who investigated soil samples from Kenya and Egypt. Majority of the Kenyan isolates belonged to *Microsporum gypseum*, while Egyptian isolates belonged to *T. mentagrophytes*.

The few Nigerian reports include that of Apinis & Clark [4], who isolated *Neoxenophila foetida* gen. et sp. nov., from a rat *Myonyces daltoni*. The present study is a part of a major survey aimed at finding out the distribution of dermatophytes in Nigeria.

Materials and methods

Soil samples were collected at monthly intervals

from a selected area in Jos Plateau State. The experimental area which has a savanna type of vegetation is often occupied by grazing animals (Fig. 1).

The soil samples were obtained with sterilised stainless steel corers. The samples were packed in sterile polythene bags and finally enclosed in wooden boxes and forwarded to University of Aston, U.K.

The soil pH was measured each month, just before a sample was collected. This was necessary in order to check any variation that might occur as a result of the activities of soil micro-organisms during transit. The surface layer of the soil (the humus layer) was collected at each occasion. Procedures for keratinophilic fungal analysis were begun as soon as the samples were received.

10 gm of each monthly soil sample was weighed out into each of a set of sterile petri dishes. Sterile distilled water was added and sterilised animal hair were sprinkled on the surface. The plates were wrapped in paper, incubated at 25 °C and examined regularly for a period of eight weeks for the presence of keratinophilic fungi.



Fig. 1. The experimental plot showing the savanna type of vegetation and grazing Fulani cattle.

Table 1. Monthly distribution of the keratinophilic fungi isolated from the Nigerian soil samples.

Fungal species	Distribution in the monthly soil samples												Total isolations
	Months												
	*O	N	D	J	F	MR	A	M	J	JL	AU	S	
<i>Chrysosporium keratinophilum</i> (Frey), Carmichael	..	×	×						×	×	×	×	6
<i>C. tropicum</i> Carmichael						×	×	×	×	×			5
<i>Curvularia lunata</i> Beodij			×	×	×	×	×						5
<i>Microsporium audouinii</i> Gruby								×	×	×			3
<i>M. canis</i> Bodin											×	×	2
<i>M. fulvum</i> Uriburu		×								×	×	×	4
<i>M. gypseum</i> (Bodin) Guiart Grig.		×		×	×				×	×	×	×	7
<i>M. vanbreuseghemii</i> Georg, Ajello, Friedman and Brinkman								×	×	×			3
<i>Trichophyton ajelloi</i> (Vanbreuseghem) Ajello	×	×	×					×	×	×	×	×	8
<i>T. mentagrophytes</i> (Robin) Blanchard									×	×	×		3
<i>T. soudanense</i> Joyeux								×		×			2
<i>T. yaoundei</i> Cochet & Doby Dubois									×	×			2
Totals	4	2	2	2	2	2	2	5	8	10	6	5	50
Soil pH	6.2	6.3	6.4	6.4	6.7	6.8	6.4	6.4	6.0	6.0	6.1	6.0	
Type of vegetation	Savanna Grassland												
Land use	Intensive animal grazing & ground feeding birds are often observed												

* Months of sampling. O = October, N = November, D = December, J = January, F = February, MR = March, A = April, M = May, J = June, JL = July, AU = August and S = September.

.. × Means presence of fungus.

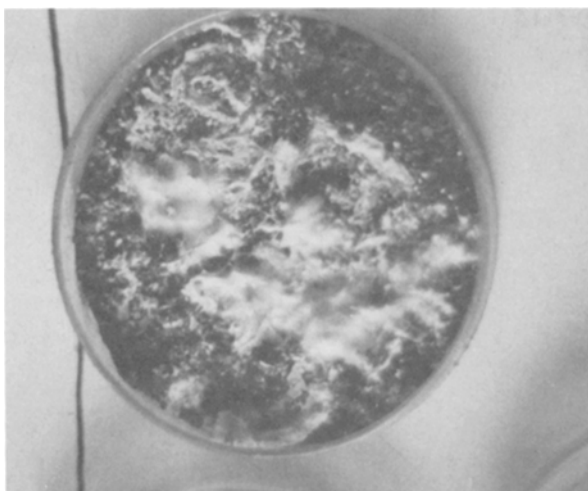


Fig. 2. The bait (animal hair) heavily colonised by keratinophilic fungi.

Results

Twelve fungal species were isolated with the hair baiting technique. Figure 2 shows the bait heavily colonised by the keratinophilic fungi. These fungi together with their monthly distributions are presented in Table 1 which also shows the land use and the pH range of the soil samples.

Discussion

The results of the survey have shown the presence of keratinophilic fungi in the Nigerian soil samples. *Trichophyton ajelloi* was the most common species in the soil samples.

The species of keratinophilic fungi isolated from the soil samples had a higher incidence by occurrence of the individual species during the rainy season (May-October). Coincidentally the grassland vegetation is in full bloom during this period and there is an increase in animal grazing. Ground-feeding birds have also been observed within the zone of sampling. Associations between keratinophilic fungi and birds have been shown to be widespread [9, 10], and it is possible that the increased rate of isolation of these fungi is related to the widespread presence of animals during the wet season (May-October). Ogbonna *et al.* [7] showed the

similarities in the species of keratinophilic fungi they isolated from the Fulani herdsmen, their herds of cattle and the leaves of plants that lined the cattle tracks. The same authors in [8] reported that there is a higher incidence of dermatophytes amongst the Nomadic Fulani in the wet season and harmattan than in the hot dry months.

The pH of the soil samples was within the range that would support the growth of keratinophilic fungi. Attention was drawn to the relationship between keratinophilic fungi and the pH of the substrates in which they occur by Marples [5] and by Pugh [11]. They both showed that *T. ajelloi* (as *Keratinomyces ajelloi*; conidial *Arthroderma uncinatum*) was most often isolated from soils with an acidic reaction. Pugh [11] did not record it above pH 6.5 in birds nests, where he found *C. keratinophilum* in near-neutral nests and *M. gypseum* in nests which were generally acidic. Muhammed & Lalji [6] reported that pH is an important factor that appears to restrict the occurrence of keratinophilic fungi in the soil. Most of their keratinophilic fungal isolates were from soils with acidic pH.

A study of the relationship between these keratinophilic fungi from soil and the animal population that graze around this area is suggested by these results.

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