

Presence Of Keratinophilic Fungi In Schools Playing Grounds In Sagamu, Ogun State, NigeriaG.C. Agu¹, W. R Shoyemi¹, B. T. Thomas², K.P.Gbadamosi¹¹Department of Microbiology, Olabisi Onabanjo University, Ago Iwoye, Ogun State, Nigeria.²Department of Cell Biology and Genetics, University of Lagos, Lagos

Corresponding author: Thomas, B.T.

E-mail: benthoa2013@gmail.com

Phone no: +2348064011412

Abstract: A total of 80 soil samples was examined from 10 school playinggrounds in Sagamu city for the isolation and identification of keratinophilicfungi using hair baiting technique. Results from this study revealed sixspecies of of organisms belonging to three different genera viz; *Aspergillus*, *Penicillium* and *Trichophyton*. The prevalence rate of these organisms were *Aspergillus niger* 45 (15.56%), *Aspergillus flavus* 45(35.56%), *Aspergillusfumigatus* 45(15.56%), *Pencillium species* 45(15.56%),*Trichophytonrubum* 45(11.11%) and *Trichophyton mentagrophytes* 45(6.65%). This studytherefore confirmed the biodynamism of the isolated organisms in theschools playing ground studied.

[G.C. Agu, W. R Shoyemi, B. T. Thomas, K.P. Gbadamosi. **Presence Of Keratinophilic Fungi In Schools Playing Grounds In Sagamu, Ogun State, Nigeria.** *N Y Sci J* 2013;6(12):127-130]. (ISSN: 1554-0200). <http://www.sciencepub.net/newyork>. 20

Keywords: Keratinophilic fungi, Playing grounds, Hair baiting technique.

Introduction

Keratinophilic fungi are keratin degrading fungi (Ulfig, 2003; Jain and Sharma, 2012) present in the environment with variable distribution patterns (Sharma and Sharma, 2010; Jain and Sharma, 2012) and are known to be affected by both intrinsic factors such as pH, moisture content and mineral contents of the soil as well as certain extrinsic factors such as temperature (Moraga *et al.*,2007).The occurrence of these organisms in man's natural and man made habitat is well documented (Ganaie *et al.*,2010; Mini *et al.*,2012; Kacinova *et al.*,2013) and their Keratin utilizing attributes has been well studied (Ulfig, 2003;Sharma and Sharma,2010;Jain and Sharma, 2012). Of these keratinophilic fungi, the dermatophyte are the most important medically (Sharma and Sharma, 2010) as the latter has been linked with various dermatophytic infection. Dermatophyte are fungi which requires keratin for growth and can cause different type of tinea in human (Mahmoudabad and Zarrin, 2008). Sagamu, a city in Ogun State, South West Nigeria, was chosen for this study because of its tropical climate and geographic diversity that favours the distribution of the studied fungal mycoflora. In view of this, this study was aimed at determining the prevalence of keratinophilic fungi circulating in school playing grounds in Sagamu, Ogun State, Nigeria.

Materials And Method
Study Site

Sagamu is one of the 20 local government in Ogun State, Nigeria, having latitude 12⁰16⁰N and 6⁰22⁰E longitude with land area of 614km².

Collection Of Soil Samples

80 surface soil samples of depth not exceeding 2-3cm were collected with the aid of a presterilized aluminium pan from selected schools playing ground in Sagamu, Ogun State, Nigeria. These surface soil samples were collected in presterilized aluminium pan (40cm x 80cm), each of these aluminium pans was labeled indicating the date and site of collection. These samples were tightly closed to maintain its original moisture content and then kept in a dark cupboard at 28±2⁰C, for not more than 2 days before analysis.

Baiting Of The Soil Sample

This was carried out using the method described by Vanbreuseghen (1952). Each of the soil sample was thoroughly homogenized and 10g portion of the soil sample was put in each of the sterile petridishes. These soil samples were wetted with sterilized distilled water to provide moisture to the soil. The presterilized hair samples used has not been exposed to deodorant before and were scattered uniformly on the wet soil in the petri dishes. Each of the Petri dishes were separately labeled indicating the date, site of collection and time of incubation. These petri dishes were then incubated at room temperature (28±2⁰C) for one month but with intermittent checking at intervals for fungal growth, if any, on the baited hair samples. Samples with visible fungal growth were subsequently subcultured to a new petri plates.

Isolation, Purification And Identification Of Fungi

The baits showing clear evidence of fungal growth were picked with the aid of a sterilized forcep for sub-culturing unto two different Saboraud dextrose agar ((SDA) ZAYO-SIGMA, Belgium) fortified with 0.05mg/ml of chloramphenicol alone and the other plate containing both 0.05mg/ml and 0.5mg/ml of chloramphenicol and cycloheximide respectively. The plates containing chloramphenicol is aimed to check bacteria growth alone while that containing chloramphenicol and cycloheximide was to inhibit both bacterial and saprophytic fungal growth respectively. All the plates showing mixed growth of fungal isolates were purified before being identified using standard microbiological technique (Sharma and Sharma, 2010).

Results

Table 1 depicts the attributes of the school playing grounds sampled for keratinophilic fungi in Sagamu, Ogun State, Nigeria. A total of 10 School playing grounds (primary and secondary) were randomly identified and used for this study. The land

area and the laboratory code used for each of the soil samples from the school playing grounds were well documented. The occurrence of keratinophilic fungi in schools playing ground in Sagamu, Ogun State, are represented in table 2. The keratinophilic fungi isolated includes *Aspergillus niger*, *Aspergillus flavus*, *Aspergillus fumigatus*, *Penicillium Species*, *Trichophyton rubum* and *Trichophyton mentagrophytes*. *Aspergillus flavus* was the most predominantly isolated organisms from the schools playing ground soil sampled with the prevalence rate of 35.56% (45). This was followed by *A. niger*, *A. fumigatus* and *Penicillium species*, all with percentage distribution rate of 15.56%(45). 8 strains of dermatophytes belonging to 2 different species viz *Trichophyton rubrum* and *Trichophyton mentagrophyte* were also isolated from the school playing grounds. In total, 45 strains of fungal microflora belonging to six different species were isolated from the school playing grounds (Table 3). The macroscopic and microscopic characteristics of the isolated keratinophilic and dermatophytic organisms are represented in table 4.

TABLE 1 Attribute of the school playing ground, sampled for keratinophilic fungi in Sagamu, Ogun State, Nigeria.

	School Playing ground	Location	Code	Land area	Number of Species collected code use
1	St. Paul Primary School	Makun	PAM	105x68M	4(PAM 1 PAM2, PAM 3, PAM 4)
2	United African Methodist Church School Eleja	Eleja	PGE	103x63M	4(PGE1, PGE2, PGE 3, PGE4)
3	AUD Nursery and Primary School	Isale oko	PGAPS	103x63M	4(PGAPS1, PGAPS 2, PGAPS 3, PGAPS 4)
4	Batoro Community Grammar School	Isale Oko	PGB	103x63M	4(PGB 1, PGB 2, PGB 3, PGB 4)
5	Wesley School II Oko	Ita Oba	PGI	100x60M	4(PGI 1, PGI 2, PGI 3, PGI 4)
6	African Church Primary School	Ijoku	PGIJ	100x64M	4(PGIJ 1, PGIJ 2, PGIJ 3, PGIJ 4)
7	Sagamu High School	Makun	SHS	103x66M	4(SHS 1, SHS 2, SHS 3, SHS 4)
8	Local Government Primary School	Agura	LG	105x68M	4(LG 1, LG 2, LG 3, LG 4)
9	Muslim College	Sabo	PGMS	105x68M	4(PGMS 1, PGMS 2, PGMS 3, PGMS 4)
10	Methodist High School	Ijoku	MHS	105x68M	4(MHS 1, MHS 2, MHS 3, MHS 4)

Table 2 Occurrence of keratinophilic fungi in schools playing ground in

Sagamu, Ogun State, Nigeria.							
Playing grounds	Keratinophilic fungi						
n	AN	AF	AFU	PS	TR	TM	
PAM 1	2	+	+	-	-	-	-
PAM 2	2	+	+	-	-	-	-
PAM 3	2	-	-	-	+	-	-
PAM 4	2	-	-	-	+	-	-
PGE 1	2	-	-	-	+	-	-
PGE 2	2	-	-	-	-	+	-
PGE 3	2	-	-	+	-	-	-
PGE 4	2	-	+	-	-	-	-
PGAPS 1	2	-	-	+	-	-	-
PGAPS 2	2	-	-	-	+	-	-
PGAPS 3	2	+	+	-	-	-	-
PGAPS 4	2	-	-	+	-	-	-

PGB 1	2	-	-	+	+	-	-
PGB 2	2	-	-	+	-	-	-
PGB 3	2	-	+	-	-	-	-
PGB 4	2	-	+	-	-	-	-
PGI 1	2	-	-	-	-	-	-
PGI 2	2	-	-	+	+	-	-
PGI 3	2	-	+	-	-	-	-
PGI 4	2	-	-	+	+	-	-
PGIJ 1	2	-	-	-	-	+	-
PGIJ 2	2	-	-	-	-	+	-
PGIJ 3	2	-	+	-	-	-	-
PGIJ 4	2	-	+	-	-	-	-
SHS 1	2	-	-	-	-	+	-
SHS 2	2	-	+	-	-	-	-
SHS 3	2	-	+	-	-	-	-
SHS 4	2	-	-	-	-	-	+
LG 1	2	+	-	-	-	+	-
LG 2	2	+	-	-	-	-	-
LG 3	2	-	-	-	-	-	-
LG 4	2	-	+	-	-	-	+
PGMS 1	2	-	+	-	-	-	-
PGMS 2	2	-	-	-	-	-	-
PGMS 3	2	-	-	-	-	-	+
PGMS 4	2	-	-	-	-	-	-
MHS 1	2	+	+	-	-	-	-
MHS 2	2	+	+	-	-	-	-
MHS 3	2	-	+	-	-	-	-
MHS 4	2	-	-	-	-	-	-

+ = Present

- = Negative

AN = *Aspergillus niger*AF = *Aspergillus flavus*AFU = *Aspergillus fumigates*PS = *Penicillium species*TR = *Trichophyton rubrum*TM = *Trichophyton mentagrophytes*

n = Number of samples collected from each location

Table 3 Prevalence of keratinophilic fungi and other dermatophytes in schools playing ground

Keratinophilic/Other Dermatophytes	n	%
AN	7	15.56
AF	16	35.56
AFU	7	15.56
PS	7	15.56
TR	5	11.11
TM	3	6.65
TOTAL	45	100

Discussion

Keratinophilic fungi are important ecologically and recently have attracted attention throughout the world. They play a significant role in the natural degradation of keratinized residues (Sharma and Rajak, 2003; Fillipello *et al.*,1994, Fillipello,2000). These organism are known to share some

characteristics with dermatophytes and some can probably cause human and animal infections (Restrepo and Deuribe, 1976;Alli-shatayeh *et al.*,1989;Connole, 1990; Cano *et al.*,1991; Filipello *et al.*,1996; Speiwak,1998;Spiewak and Sztak,2000). Of the isolated keratinophilic fungi, *Aspergillus flavus* was the most predominant, with prevalent rate of

35.56% (45). This observation is contrary to that of Mini *et al.* (2012) who reported *Aspergillus niger* as the most prevalent in their own study. The reason for this observation may not be unconnected to differences in the study site, as well as the study region. In recent years, a lot of studies documented, the presence of keratinophilic and dermatophytic fungi in soil (Jain and Sharma, 2012; Mini *et al.*, 2012; Kacinova *et al.*, 2013; Mahmoudabadi and Zarrin, 2008; Ganaie *et al.*, 2010). The presence of these organisms in the soil is not surprising as this environmental conditions is well known as the source of varieties of micro organisms (McCoy *et al.*, 1992; Moraga *et al.*, 2007) including Keratinophilic fungi. Some of the isolated organisms especially *Aspergillus* and *Penicillium* species are important mycotoxin producing organism (Aish *et al.*, 2004; Speijers, 2004). Mycotoxin are secondary metabolites produced by some fungal isolates known not to be toxic to the producer but to the consumer of the substrate containing them (Kuiper – Goodman, 2004). It was concluded that the investigated playing grounds harbors arrays of keratinophilic fungi.

References

1. Ali Shatayeh MS, Arda HM, Hassouna M Shaheen SF (1989) Keratinophilic fungi in Sheep Hairs from meet Bank of Jordan. *Mycopathologia*, **106**: 95-101
2. Aish JL, Rippon I Barlow SJ (2004). Mycotoxins in food. *Detection and control*, **307**: 56-59
3. Cano J Garro J Figueras MJ (1991). Study of the invasion of hair in vitro by *Aphanoascus spp.* *Mycoses*, **34**:145-152.
4. Connole M (1990). Review of animal mycoses in Australia. *Mycopathologia*, **11**:133-165.
5. Phillipello MV, Pnevve L, Tullio V (1996). Fungi responsible for skin infection. *Mycoses*, **39**:141-150
6. Ganaie MA, Sood S, Rizti G and TA Khan (2010). Isolation and identification of Keratinophilic fungi from different soil sample in Jhansi city, India. *Plant pathology* **9**(4): 194-197.
7. Jain N, Sharma M (2012). Biodiversity of Keratinophilic fungal flora in university campus, Jaipur India. *Iranian J publ Health*, **41**(11):27-33.
8. Kacinova J, Dana T, Roman L (2013). Isolation of dermatophytes in outpatient patients. *Journal of Microbiology, Biotechnology and Food sciences*, **12**:1436 – 1446.
9. Kuiper -Goodman T (2004). Mycotoxins in food, In: *detection and control*, pp 3-2.
10. Mahmaudabodi A and Zarri M (2008). Isolation of dermatophytes and related keratinophilic fungi from two public parks in Ahaz. *Jundishapur journal of microbiology* **1**(1) : 20-23.
11. Mcloy Clayton W, Gneggary K, Storey M Silvana T (1992) Environmental factor affecting entomopathogenic fungi in the soil. *Agropec brass brastlia*, **27**,107-111.
12. Mini KD, Jyothis M, Sampathkumar S, Mini (2012). Keratinophilic fungal diversity of soil from ernakulam and thrissur districts, Kerala. *European Journal of Experimental Biology*, **2**(4) : 1261-1264.
13. Moraga Q, Juan A, Alaulas C, Elizabeth AA, Maranhao A, Ortiz U, C (2007). Factors affecting the occurrence and distribution of entomopathogenic fungi in natural and cultivated soils. *Mycological research*, **111**: 947-966.
14. Nifig K (2003). Studies of keratinolytic and keratinophilic fungi in sewage sludge by means of a multi-temperature hair batings method. *Polish journal of environmental studies*, **12**(4): 461- 466.
15. Rastrepo A, Deuribe L (1976). Isolation of fungi belonging to the genera *Geotrichum* and *Trichosporon* from human dermal lesions *Mycopathologia*, **59**:3-9.
16. Sharma R, Rajak RC (2003) Keratinophilic fungi; Natures keratin degrading machines. their isolation, identification and ecological role. *Resonance*, **4**: 28-40.
17. Sharma M, Sharma M (2010). Incidence of dermatophytes and other keratinophilic fungi in the schools and colleges playing ground of jaipur, India. *African journal of microbiology research*, **4**(24): 2647 – 2654.
18. Spiewak R (1998). Zoophilic and geophilic fungi as a cause of skin disease in farmers. *Ann. Agr. Environ Med.*, **5**(2) : 97-102.

12/2/2013