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SOME STUDIES ON VERTICAL PROFILE OF AIR BORNE MYCOFLORA OF LAHORE

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Abstract

A survey of vertical profile of air-borne fungal spore concentration of district Lahore was carried out from October 2006 to September 2007. A site close to academic block of University of the Punjab, Quaid-e-Azam campus was selected for study. The concentration of atmospheric fungal spores was studied by using 9 cm diameter Petri dishes containing MEA and PDA media exposed to different levels of heights viz.; 0, 1.82 and 3.63 m for five minutes. The fungal colonies appeared were identified on the basis of their microscopic and macroscopic morphology. The results showed an incidence of several different fungal species with four major genera viz; *Alternaria*, *Cladosporium*, *Aspergillus* and *Penicillium*. The highest growth of fungal colonies was observed in the month of May. The monthly variation of air-borne fungi was studied both qualitatively and quantitatively.

Introduction

Over the last few years a significant progress has been observed in the study of air-borne fungi, because of the medical and phytopathological consequences associated with fungal spores (Picco & Rodolfi, 2000). Fungal allergy is a worldwide problem and depending on geographic and climatic conditions, the prevalence of allergy to molds might be as high as 30% (Horner *et al*, 1995). Fungal spore constitute a major component of airborne spore flora hence it is important to study the aeromycology of populated areas on regular basis.

With reference to Pakistan, only scattered information is available in the form of measurements done at some specific outdoor and indoor environments (Shah & Bashir, 2008; Nasim *et al*., 1998; Bajwa *et al*., 1995). Sensitization to fungi particularly *Alternaria alternata* (Fries) Keissler. has been linked to presence, persistent and severity of asthma (Bush & Prochnau, 2004). *Cladosporium herbarum* (Pers.) Link. represents another example of allergenic air-borne fungal species of worldwide occurrence (Swärd-Nordmo *et al*., 1989).

The major aim of this study was to provide a baseline data on the vertical profile of myco-flora of Lahore throughout the year.

Materials and Methods

The aero-mycological data collection was started from October 2006 and continued till September 2007. The study was conducted near the academic block of University of the Punjab Quaid-e-Azam campus, Lahore.

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The site was sampled every month and two different media were used viz; Potato Dextrose Agar (PDA) and Malt Extract Agar (MEA) with dissolved Streptomycin to exclude bacterial colonies. Ten Petri dishes (9 cm in diameter) were exposed at different height levels of 0, 1.82 and 3.63 m for 5 min in the air at 10:00 am following cultural plate exposure method (Gregory, 1973). The exposed Petri dishes were then incubated at 25±1ºC for 5 to 10 days and regularly examined. Fungal colonies appeared were counted and sub-cultured on appropriate media for identification.

Results and Discussions

Data calculated on percentage of different fungal species on MEA medium revealed that *Aspergillus niger* van Tieghem., *Alteraria alternata*, *Cladosporium herbarum*, *Drechslera australiensis* Bugnicourt Subramanian & Jain. were most frequently occurring fungal species with their year round appearance except for *D. australiensis* being absent only in the month of January. It was noticed that almost all of the above mentioned species were also documented from three selected levels of sampling. Maximum number of fungal species (11) was recorded during the month of January followed by March with a total of 10 species (Table 1). However, it appeared from the data that more fungal species present at all the three sampling heights in the month of March than in any other part of the year. This could be due to availability of relatively high moisture in the air with an increasing temperature during the spring months.

Aspergillus niger colonies were found to be maximum during the month of December (66.3%) followed by *Fusarium solani* f. pisi (F.R. Jones) in May (41%) and *A. alternata* in March (33.3%) (Table 1). The data also revealed that *A. niger* isolates prefer cold weather, while *A. alternata* and *F. solani* are well represented in moderate and hot weather respectively. It was further observed that some fungal species were consistent with the sampling height, like that of *Mucor* sp., which was found only at 1.82 m height level and *Monilia sitophila* Montagne. being absent at above 1.82 m levels. It was also found that spores of some fungal species appear only in a particular season like that of *Aspergillus flavus* Johann Heinrich Friedrich Link., *Fusarium dimerum* Penzig, *Mucor* sp., *Monilia sitophila* being consistent with the month of September on both MEA and PDA media (Table 1 & 2). *Cladosporium herbarum*, *A. niger* and *A. alternata* have been reported to be major allergy causing fungal agents (Swärd-Nordmo *et al*., 1989) and unfortunately, in the this study, they were observed to be present in year round at all the selected sampling heights.

Data recorded on the number of fungal colonies on different media at three sampling levels showed that at ground level maximum number of colonies (17) were recorded in June on PDA followed by April and October. This high appearance of colony number in summer may be due to the availability of extra moisture in the air. Dale *et al.* (2003) had also noticed that fungal spores as aeroallergens increase to very high level in late summer. On MEA, the colony number was almost equal during March to July 2007 at 1.82 m level, and then this gradually declined till February being lowest in terms of number of fungal colonies counted. However, on PDA, minimum number of fungal colonies were counted in January and maximum in May (Figure 2). It was noticed that at 3.63 m, the number of colonies reported were 15 on MEA in May (Figure. 1) followed by April then a gradual decline was observed. On PDA, a similar pattern was noticed with maximum colonies (13) represented in the month of May on MEA. It is concluded from this study that maximum fungal spore may be present in the month of May and then there is a gradual decline for the rest of months to follow.

A high incidence of *Aspergillus* and *Penicillium* spp. may attributed to surrounding presence of vegetation with high relative humidity and temperatures. Most of the fungal air spora are suspected to come from the vegetation (Awad, 2005) rather than from soil. The phylloplanes can allow for the growth of several saprophytic and parasitic fungi which become a significant source of air spora (Picco & Rodolfi 2000).

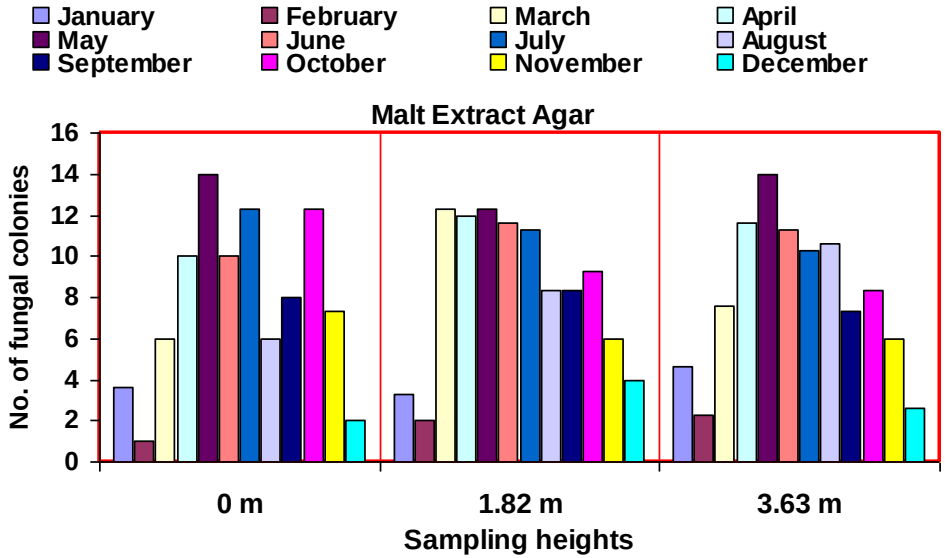

Fig. 1. No. of fungal colonies appeared each month at different height levels on MEA medium.

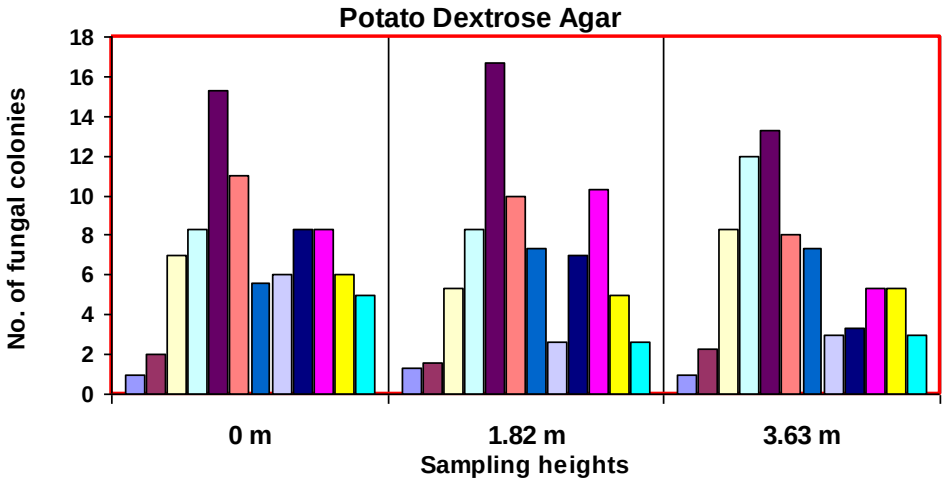

Fig. 2. No. of fungal colonies appeared each month at different height levels on PDA medium.

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