

Aeromycological study of Jnanabharathi campus, Bangalore University, Bangalore, Karnataka

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Air borne fungi are the most common organisms in nature. They were correlated with the air pollution and were proposed as a cause of adverse health effects on humans, animals and plants (Bush and Portnoy, 2001). The main source of viable airborne mycoflora is the soil, water and vegetation, and they vary with time and season. The fungal spores are transported to the atmosphere and are always associated with fine dusty particulate matter. The air we breathe contains an array of bio-pollutants comprising of viruses, bacteria and algae, spores of cryptogams, pollen grains, microscopic fragments of plants and animals, small insects, protozoans, volatile materials including scents and terpenes (Jain and Mishra, 1998). Out of these, the fungal aeromycoflora has an important role in causing human allergy (Sanches, et al., 1999) and Plant pathology (Mughal, 2002). Over the last few years a significant progress has been observed in the study of airborne fungi, because of the medical and phytopathological consequences associated with fungal spores (Picco and 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, 1995). The main objective of the present study is to identify the normal flora of the outdoor atmosphere of Jnana bharathi campus.

The study was carried out at Jananabharati campus of Bangalore, Karnataka, India in 2007. The settle plate techniques (Aneja, 1996) were adopted for

trapping the aeromycoflora. Petri plates containing 10ml of potato dextrose agar media with the antibiotic (25mg of chloramphenicol per 100ml of medium) were used. The petriplates was exposed for 5minutes in areas like canteen, playground, lawn and main road and incubated at 28⁰C till the appearance of growth. The fungal colonies were counted and got identified by literature (Ellis, 1976; Jamaluddin and Tondon, 1976 and Subramanian, 1971). A comparative study was done of the normal flora of the outdoor atmosphere, at various locations like canteen, playground, lawn and mainroad of Jnana bharathi campus.

Air spora is the term used for the population of air borne particles of plant and animal origin. Though air is not a medium in which microorganisms can grow but has a carrier particulate matter, dust and droplet which can be laden with microbes. The number and type of microbes in the air is determined by the source of contamination in the environment. For example: microorganisms can spread by coughing, sneezing from the human respiratory tract. Circulation of dust particles from the surface of the Earth by air current can also disperse microorganisms in the atmosphere.

The results obtained are represented in figures 1-4. A total of 10 genera were identified like *Aspergillus*, *Penicillium*, *Fusarium*, *Alternaria*, *Gliomastix*, *Phoma*, *Curvularia*, *Trichoderma*, *Bipolaris* and *Rhizoctonia*. The maximum fungal load in the present study was seen in the canteen and minimum in the main road followed by

play ground and lawn. Though quantitatively the number showed wide range of variation, some of the isolates were common in at least three out of the four areas studied. The genera of *Aspergillus niger*, *Fusarium*, *Alternaria* and *Curvularia* were dominated aeromycoflora of the studied areas. The next common isolates were the *Trichoderma*, *Phoma*, *Gliomastix*, *Bipolaris*, *Aspergillus flavus*, *Penicillium* and *Rhizopus*.

Most of the fungal air spora are suspected to come from the vegetation (Awad, 2005) rather than from soil. The phylloplanes can allow the growth of several saprophytic and parasitic fungi which become a significant source of air spora (Picco and Rodolfi, 2000). These isolates may lead to many health problems for people living in this area and working in such atmosphere. From the hospital records, it is clear that the incidences of respiratory disorders, allergies and asthma are increasing. The least number of organisms was found on the main road location which could be due to high wind velocity at the time of exposure. The maximum number of colonies was found in the canteen and lawn which could be due to unhygienic conditions in the canteen and plants and grass in the lawn. The play ground showed comparatively less organisms which could be due to less activity and clean environment at the time of exposure. Environmental parameters like temperature, relative humidity and rainfall seem to play important role in distribution of air microflora as reported by Minakshi Mahajan and Pande (2004).

In India, Shivpuri (1982) recorded important allergic fungi in order of their frequency and allergenic significance as *Curvularia*, *Alternaria*, *Helminthosporium*, *Cladosporium*, *Aspergillus* and *Rhizopus*. *Alternaria* and *Curvularia* are known to be

potentially allergenic (Feinberg, 1935; Tilak, 1998). *Aspergillus*, *Alternaria*, *Curvularia* are proven allergens (Chitaley, 1977). Allergenic diseases due to *Aspergillus* were recorded by Citron (1962). *Curvularia* and *Alternaria* are known to initiate hypersensitivity reactions (Ravindran, 1986). *Fusarium* and *Alternaria* are plant pathogens (Ramachandra Rao, 1991). In present study, all four microbes viz., *Aspergillus*, *Alternaria*, *Curvularia* and *Fusarium* were found to be dominant thus indicating the precautions to be taken. *Rhizopus* may cause allergenic rhinitis and asthma when inhaled by sensitive individuals (Citron, 1962). It may cause respiratory symptoms and airway diseases. The relevance of allergenic *Rhizopus* spore load in air to ailing patients and human health hazard is recorded by Khilare (1989). It is well documented by earlier workers that exposure to outdoor biopollutants increases the airway responsiveness to the aeroallergens and causes allergy. The present investigation clearly point out the prevalence of large percentage of allergens in the study area, which may be responsible for inducing allergic reaction to sensitive individuals. It is interesting to note that most of them are either is proven allergens or causing hypersensitive reaction and few are plant pathogens or saprophytic (Ramachandra Rao, 1991).

Fungi and bacteria contaminate water and air, causing many human, animal and plant diseases (Gregory, 1973). The contaminated air and water are believed to be responsible for gradual increase in the incidence of dermal and respiratory diseases (Mughal, 2002). The interaction of fungal spores with lung structures may be important for the development of respiratory allergies induced by air borne fungal allergens (Geiser et al., 2000). Apart from their direct allergic effect, fungi may carry mycotoxins in their spores or produce

volatile metabolites (Miller, 1998). Inhalation of mycotoxins such as aflatoxins, secalonic acid, zearalenone and tricothecenes produced by *Aspergillus*, *Penicillium* and *Fusarium* spp, may affect the immunological response of the lung tissues or cause other hazards to human health (Gerberick and Sorenson, 1983).

CONCLUSION

The present work was concerned with aeromycological sampling of outdoor

environments of four sites viz. canteen, playground, lawn and mainroad of Jnana bharathi campus, Bangalore. The maximum fungal load in the present study was seen in the canteen and minimum in the mainroad followed by play ground and lawn. The frequent culturable and dominated aeromycoflora in the four sites were *Aspergillus niger*, *Fusarium*, *Alternaria* and *Curvularia*. The next common isolates were the *Trichoderma*, *Phoma*, *Gliomastix*, *Bipolaris*, *Aspergillus flavus*, *Penicillium* and *Rhizopus*.

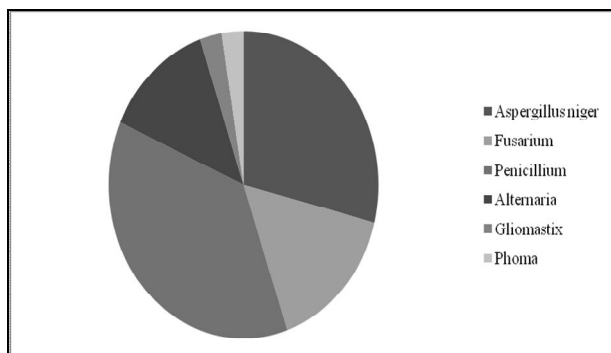


Figure 1: Showing the percentage of fungal colonies in canteen

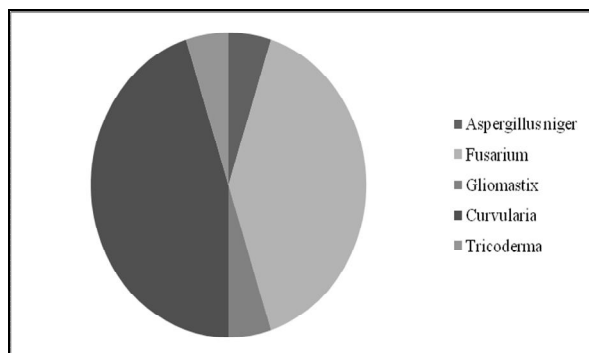


Figure 2: Showing the percentage of fungal colonies in playground

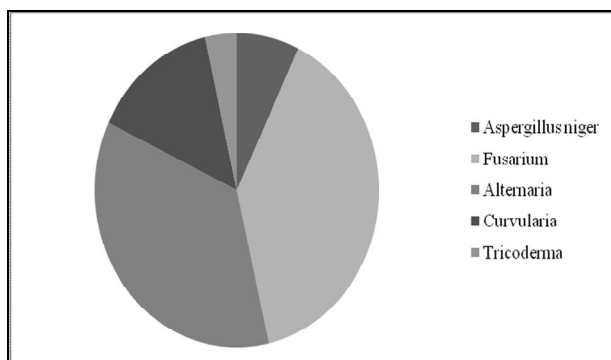


Figure 3: Showing the percentage of fungal colonies in lawn

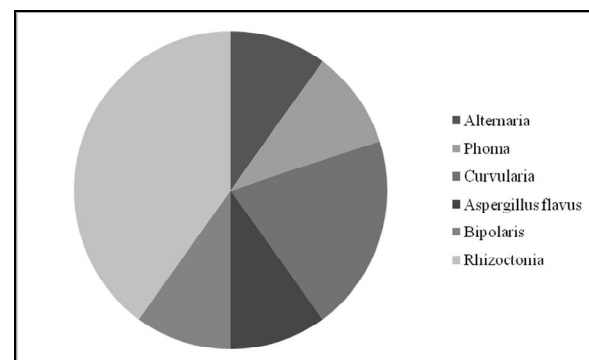


Figure 4: Showing the percentage of fungal colonies in main road

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[MS received 02 July 2013;
MS accepted 25 September 2013]

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