RESEARCH ARTICLE

Fungal Aeromicrobiota of Kamptee, Nagpur, India

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ABSTRACT

Atmosphere is rich source of diverse groups of contaminants which may be biological or non biological in origin. Maximum contaminants have hazardous health effects such as allergic reactions, asthma, varied skin diseases, internal organ infection and toxicity as well. In the present study the mycological survey was carried out for one year from May 2013 to April 2014 by Volumetric Tilak Air Sampler which is known to capture approximate 75% of bio-particles. Aerobiological studies are of great importance as they provide with qualitative and quantitative information about airborne fungi in a given region. Total 24 Fungal spores were identified. *Alternaria, Artrinium, Ascospores, Beltrania, Bispora, Cladosporium, Curvularia, Didymosporium, Eppicoccum, Helminthosporium, Mold spores, Rust spores, Smut spores and Yeast* was observed throughout the year.

Key Words: *Fungal Spores, Tilak Air Sampler, Allergy, Seasonal, Spore/m³.*

INTRODUCTION

In the course of evolution, the fungi are adapted to transfer by means of air in greater extents comparatively to any other biological components which are transferred by wind such as pollen, insect, bacteria etc. Due to inhalation of fungal spores, toxicity is caused such as aspergillosis, allergic asthma, and some of saprophytic fungi are opportunistic pathogens which cause's skin diseases or any other internal organ diseases. Because of this they are termed as bio-contaminants, although they are indicator of pollution. (Ananthanarayan and Panikar, 2009)

Hazardous effects of fungi on human, animals and plants health can be minimized by monitoring the quality of air for knowing the diversity, abundance and variation according to seasonal changes. The day by day changing atmosphere affect the quality of air, reasoned due to change of its Biological and Non-biological components. For understanding of these variant phenomena, the continuous air sampling is needed. For this cause, the present study was carried out.

MATERIAL AND METHODS

The 'Volumetric Tilak air sampler'(Tilak and Kulkarni,1970) was fixed at the roof of Seth Kesarimal Porwal College, Kamptee at the height of 50 feet from

ground and runs continuously from May 2013 to April 2014. The glycerin jelly mounted 16 slides were prepared from Vaseline coated cello tape, removed from rotating drum of the sampler at the end of 8th day. The slides were scanned (Tilak, 1989) and fungal spores were observed, counted under Binocular microscope and identified by the standard literature. The Spores per cubic meter were calculated by the following formula:

Spores/m^3 = No. of same type of spore X 14

Where 14 is the conversion factor for Tilak Air Sampler)

RESULTS AND DISCUSSION

Total 24 Fungal spores were identified and others were separated from fungal spore which includes Pollen, Insect parts, hyphal fragments and some unidentified spores. Mold spores were represented by the spores of *Rhizophus, Mucor, Aspergillus, Penicillium species*. During a whole year total count of fungal spores was 60,662 spores/m^3 calculated. [Table –I] shows the monthly contribution of each fungal spore. February month showed highest 6510 CFU/M^3 followed by December, November and January. Throughout the year *Cladosporium* spore was most dominant after the *mold* spores [Fig.1].

A clear variation was seen among the fungal spores with respect to seasons. July, August, April and May shows the least count and diversity as well. Some spores were observed throughout the year like *Alternaria, Artrinium, Ascospores, Beltrania, Bispora, Cladosporium, Curvularia, Didymosporium, Eppicoccum, Helminthosporium, Mold spores, Rust spores, Smut spores and Yeast*. Some spores are seasonal, *Cercospora*

Table 1: Month wise count of Fungal spores of recorded species

Fungal Types	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Alternaria	308	280	252	224	182	168	196	210	238	252	266	336
Artrinium	224	168	126	112	112	210	252	196	252	266	280	322
Ascospores	196	224	308	336	364	392	406	252	224	252	196	182
Beltrania	252	182	168	154	168	196	210	224	252	266	280	308
Bispora	224	196	126	112	252	308	322	364	350	210	280	196
Cercospora	0	0	0	0	364	280	266	252	224	224	0	0
Chaetomium	0	28	42	70	84	126	140	168	182	112	70	0
Cladosporium	350	392	378	364	532	476	532	560	630	602	420	350
Curvularia	392	378	112	98	126	140	196	224	238	266	294	336
Didymosporium	168	196	84	56	140	168	196	224	238	252	196	294
Epicoccum	210	252	168	126	210	252	210	252	266	280	238	182
Fusariella	28	28	42	14	0	56	70	98	70	42	84	98
Helminthosporium	252	308	112	98	84	406	420	364	378	392	336	294
Hirudinaria	14	28	0	0	0	0	42	56	42	14	0	0
Leptospheria	42	70	0	0	0	56	98	112	70	84	0	0
Mold spores	1190	840	350	406	560	672	896	840	770	1050	1008	1260
Nigrospora	0	0	56	84	112	140	168	196	84	112	56	0
Pithomyces	336	280	0	0	42	28	14	56	42	98	140	252
Rust spores	28	126	42	28	84	126	168	196	224	308	364	140
Smut spores	364	392	140	98	182	210	238	238	280	336	378	406
Spegazzinia	56	42	0	0	0	112	210	252	280	322	182	126
Tetraploa	0	42	14	14	84	126	98	112	70	126	28	28
Torula	0	28	0	0	126	140	168	182	98	112	84	0
Yeast	14	42	140	98	224	252	196	224	266	280	42	70
Others	210	252	224	238	280	336	364	406	280	252	168	266
Total	**4858**	**4774**	**2884**	**2730**	**4312**	**5376**	**6076**	**6258**	**6048**	**6510**	**5390**	**5446**

and *Chaetomium* were observed in rainy season. *Hirudinaria* and *Leptosperia* were observed in winter. *Fusariella, Pithomyces, Spegazzinia, Tetraploa*, and *Torula* observed in winter and in the beginning of summer as well [Fig. 2: a, b and c]. A *mold spore shows* the highest peak in the month of April and May. Fig –III shows the yearly variation of fungal spores. Their curve represents the increase and decrease of their spore/m3 count.

Majority of Fungi are air borne and they vary greatly according to weather conditions and climatic factors. Many types of fungal spores are recorded from different environment (Hazarika et al., 2008; Cholke and Mahajan, 2008) Deforestations for settlement and Industrialization have huge impact for the diversity, variation and composition of air flora. The presence of yeast spores throughout the year is due to many small-scale bakery industries in Kamptee. The *yeast* and *yeast* like spores of *candida* are responsible for many diseases such as candiosis and asthma as well (Giri and Sawane, 2010). Lyon et al. (1984) and Grinn-Gofron et al. (2011) supported that the atmospheric factors and microclimate results in unique airomycoflora. The presence of *Alternaria, Artrinium*, *Beltrania*, *Curvularia*, *Fusariella*, *Helminthosporium*, *Pithomyces*, *Rust spores*, *Smut spores*, *Spegazzinia* spores in dry, warm air of summer was due their structural morphology, size and shape (Tilak, 2009) which were important for the buoyancy in air. The study of Skin Prick Test showed that varied range of fungal spores and its mycelium such as *Cladosporium, Aspergillus, Penicillium, Basidiospores* and *Uredospores* were proved to be allergic for different age group of peoples (Chakraborti et al., 2012). The above types of spores were high in concentration in present study.

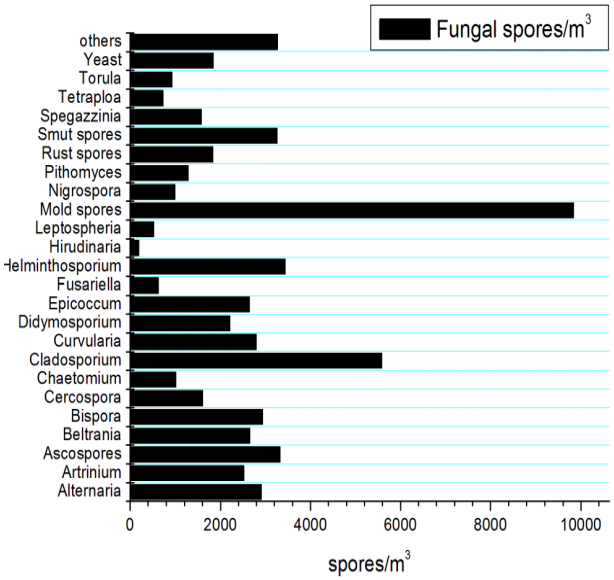

Fig. 1: Total fungal colonies count of recorded species

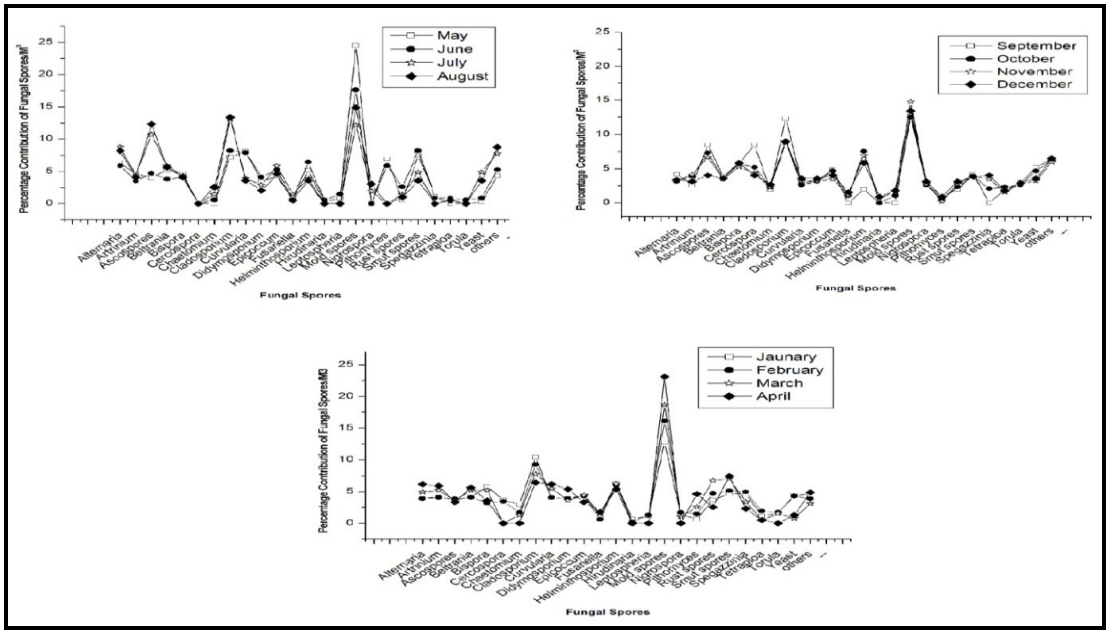

Fig. 2: a, b and c: Month wise fungal spore count variations

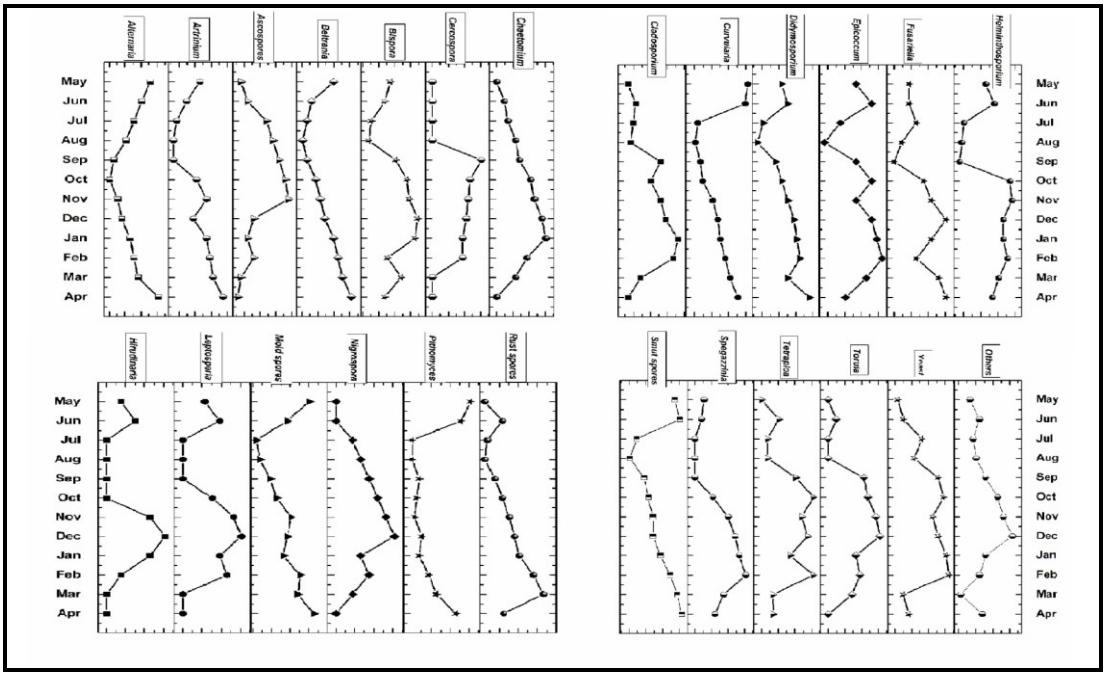

Fig. 3: Yearly variation of each fungal species recorded

CONCLUSION

Presences of yeast like spores were unique to the Kamptee environment. The high rainfall of July 2013 and August 2013 give minimum spore count and diversity which was result due to washout of spores, perhaps the mild rainfall was critical for the liberation of *ascospores*.

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