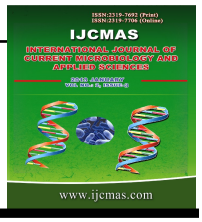
Int.J.Curr.Microbiol.App.Sci (2013) 2(3): 44-48

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 2 Number 3 (2013) pp. 44–48**
http://www.ijcmas.com



Original Research Article

Study of Fungal Spores Diversity, in Malebenur Region of Karnataka, India

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Keywords

Fungal diversity; Airborne fungi; Spores; Malebenur region.

A B S T R A C T

A diversity of atmospheric fungal spores was carried out at Malebenur region, situated in the Davangere district part of Karnataka (India). The study site represents a rural and semi-urban area. The incidence of the fungal spores in the air was studied by the simultaneous exposure of petri dishes plates containing potato dextrose agar media for 15 min per week for 6 months at the height of 6 meters (January 2012 to June 2012). The exposed sample is incubated at 26ºC for 7 days. The slides exhibited a preponderance of spores of *Alternaria, (18.2%) Cladosporium(4.0%), Curvularia,(4.5%) Fusarium, (3.2%) Aspergillus fumigatous (29.9%)Penicillium,(26.7%) Mucor, (3.2%) Rhizopus (7.5%).* Species of *Alternaria, Aspergillus, Fusarium,* and *Penicillium* showed excellent fungal growth on the exposed culture media containing petriplates. Several other types of spores were also found in comparatively low numbers. The monthly variation of these air-borne fungal were studied qualitatively and quantitatively.

Introduction

Airborne fungal spores identifying for a number of reasons including assessing the air quality, detection of pathogenic organisms, epidemiological study and study the human health Hazards. Before sampling for airborne fungal spores it's important to have clear objectives and the data that would meet those objectives. Some of these objectives require counting and identification of the airborne fungal particulates. Temperature and relative humidity play an important role in increasing fungal population in the environment of Karachi Afzal *et al*.,(2004) the spore are better live on the moist surfaces of the lining of the air ways and they are subsequently expelled in mucus. There are plants and animal groups including human being are sensitive to the air particles, which can be monitored through proper quantification and standardization of habitat responses and sensitivity in biological species Agarwal *et al*., (1969) Since fungal spores have long been known as one of the important environmental bio-particles causing dermatitis, respiratory and cardiac diseases along with allergic manifestation in human

beings. The measurement of allergenic fungal spore concentrations in the air helps allergists to diagnose what type of fungi patients with asthma are sensitized to and when treatment should be applied to be the most effective. Additionally, information about high fungal spore concentrations enables people to avoid exposure at certain hours and days during the fungal spore season (Magdalena *et al.,* 2006)

Therefore, a preliminary study on air borne fungi has been conducted in Malebenur region of Davangere District, Karnataka. In this concern the study on airborne biological materials, mainly fungal spores and pollens and their impact on biological species is an important aspect. Jacobs *et al.,*(1951) elaborated the term to include dispersion of air borne insect populations, fungal spores, pollen and bacteria.

Materials and Methods

Malebennur region in Harihara Taluk, of Davangere District, Karnataka State. Malebennur is located 16.8 km distance from its District Main City Davanagere. It is located 262 km distance from its State Main City Bangalore. Other villages in Harihara Taluk are Bannikodu, Banuvalli, Belludi, Devarabelakere, Haralahalli, Haralapura, present investigation an extensive survey was conducted for the air in a different sampling station of malebenur area. Four locations of the city were selected for Sampling, Malebenur city (S1), Bus stand area (S2), Rice mill area (S3), Village area (S4).

The Monthly air sampling were exposed with Potato dextrose agar medium at the height of 6 meter above the ground level for a period of six month, The exposed sample Petri plate is incubated at 26ºC for 7 days for the, purpose of their identification. Identification of the fungal spores was done on the basis of microscopic examination and with the help of available literature.

Result and Discussion

The air spores of a malebenur region is influenced by topography and meteorological parameter of the concerned area. A total 9 different fungal spore types have been identified during the study in which *Aspergillus, Penicillium, Mucor* and *Rhizopus* are reported as human pathogen. The total no. of fungal spores were found (685) during the January 2012 to June 2012.

The dominant fungal spores were of *Aspergillus fumigates* (29.04%), followed by *Penicillium* sp., (26.7%), *Alternaria* sp. (18.2%), *Mucor* sp. (6.77%) and Unidentified sp (8.7%) (Fig.1). In month of May to June2012 is shows highest incidence 354 number of fungal spores and the minimum number of fungal spore were observed during the month of January to February 2012 with 116 number of fungal spores.

Figure .1 Showing Monthly variation in Diversity fungal spores

Table.1 Diversity of fungal spore identified in month of January 2012

S.L No	Spore Type	No of Spores in a sampling station				Total no of spore	% of spores
		S1	S2	S3	S4		
1	*Alternaria*	7	1	2	1	11	18.3
2	*Aspergillus fumigatus*	3	1	1	1	6	10
3	*Cladosporium*	0	0	1	0	1	1.6
4	*Curvularia*	2	1	3	1	7	11.6
5	*Fusarium*	0	2	0	2	4	6.6
6	*Mucor*	1	2	1	2	6	10
7	*Pencillium*	6	5	1	3	15	25
8	*Rhizopus*	4	3	1	2	10	16.6
9	*Unidentified*	0	0	0	0	0	0
	Total	23	15	10	12	60	

Table.2 Diversity of fungal spore identified in month of February 2012

S.L No	Spore Type	No of Spores in a sampling station				Total no of spore	% of spores
		S1	S2	S3	S4		
1	*Alternaria*	5	2	1	0	8	14.2
2	*Aspergillus fumigatus*	4	0	0	1	5	8.9
3	*Cladosporium*	0	0	1	0	1	1.7
4	*Curvularia*	2	1	2	1	6	10.7
5	*Fusarium*	0	1	0	1	2	3.5
6	*Mucor*	2	1	1	0	4	7.1
7	*Pencillium*	7	9	7	3	26	46.4
8	*Rhizopus*	0	0	1	0	1	1.7
9	Unidentified	1	1	0	1	3	5.3
	Total	21	15	13	7	56	

Table.3 Diversity of fungal spore identified in month of March 2012

S.L No	Spore Type	No of Spores in a sampling station				Total no of spores	% of spores
		S1	S2	S3	S4		
1	*Alternaria*	9	7	10	3	29	17.6
2	*Aspergillus fumigatus*	17	12	6	2	37	22.5
3	*Cladosporium*	0	0	1	0	1	0.6
4	*Curvularia*	1	1	4	1	7	4.2
5	*Fusarium*	0	1	0	1	2	1.2
6	*Mucor*	3	1	3	4	11	6.7
7	*Pencillium*	13	22	21	4	60	36.5
8	*Rhizopus*	3	2	1	0	6	3.6
9	*Unidentified*	5	3	2	1	11	0.6
	Total	51	49	48	16	164	

Table.4 Diversity of fungal spore identified in month of April 2012

S.L No	Spore Type	No of Spores in a sampling station				Total no of spores	% of spores
		S1	S2	S3	S4		
1	*Alternaria*	7	5	2	1	15	12.3
2	*Aspergillus fumigatus*	18	14	10	5	47	38.8
3	*Cladosporium*	1	0	0	1	2	1.6
4	*Curvularia*	2	2	1	3	8	6.6
5	*Fusarium*	1	0	0	2	3	2.4
6	*Mucor*	2	1	2	2	7	5.7
7	*Pencillium*	16	11	7	3	37	30.5
8	*Rhizopus*	0	0	0	0	0	0
9	*Unidentified*	1	0	0	1	2	1.6
	Total	48	33	22	16	121	

Table.5 Diversity of fungal spore identified in month of May 2012

S.L No	Spore Type	No of Spores in a sampling station				Total no of spores	% of spores
		S1	S2	S3	S4		
1	*Alternaria*	10	8	6	3	27	17
2	*Aspergillus fumigatus*	14	12	9	12	47	30
3	*Cladosporium*	0	3	8	3	14	9
4	*Curvularia*	0	0	2	0	2	1.2
5	*Fusarium*	0	1	1	0	2	1.2
6	*Mucor*	3	1	2	0	6	3.8
7	*Pencillium*	1	2	0	1	4	2.5
8	*Rhizopus*	12	10	5	10	37	23.5
9	*Unidentified*	15	1	2	0	18	11.4
	Total	52	38	35	26	157	

Table.6 Diversity of fungal spore indentified in month of June 2012

S.L No	Spore Type	No of Spores in a sampling station				Total no of spores	% of spores
		S1	S2	S3	S4		
1	*Alternaria*	12	10	09	04	35	17
2	*Aspergillus fumigatus*	20	17	11	15	63	32
3	*Cladosporium*	1	3	1	4	9	4.5
4	*Curvularia*	0	0	1	0	1	1.0
5	*Fusarium*	5	2	2	0	9	4.5
6	*Mucor*	0	1	3	1	5	2.5
7	*Pencillium*	14	08	07	12	41	20.8
8	*Rhizopus*	4	3	1	0	8	4.0
9	*Unidentified*	10	05	07	04	26	13
	Total	12	10	09	04	35	17

These all figures show great variation of presence of fungal spores in atmosphere. Summer months show less number of spores, whereas month of rainy seasons shows maximum number of spores due to moisture condition, humidity, and presence of plenty of organic matter. During investigation period, were observed that the maximum fungal spores are recorded in rainy season, moderate in summer season.

The allergenic fungal spores emphasize the importance of the study of airborne fungi in malebenur region. Fungal spores are especially important in the tropics, in which climate conditions are very favorable to the growth of fungi and may result in a high concentration of spores in the air, which in turn causes an increased incidence of allergic respiratory diseases. Although, frequent precipitation in rainy season is an important factor for the spores fall and their germination in hot and wet conditions prevailing in and around Malebenur region.

The season representing mostly saprophytic group of fungi such as *Aspergillus fumigates*, *Penicillium* sp., *Cladosporium* sp. the higher percentage of fungal propagates is obtained in rainy season because of the availability of organic substrate either living or dead and humid atmosphere. The abundance of organic matter in rainy season provide opportunity to growth of the fungi in both the groups i.e., saprophytic and plant pathogenic fungi. The present study of six month data provides preliminary information on different groups of fungi.

Acknowledgement

Author is thankful to University Grants Commission and Government First grade college Davangere, Karnataka. for financial support.

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