

ENVIRONMENTAL POLLUTION DUE TO AIRBORNE MICROBES

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Abstract -

Thirty six different fungal spores were isolated and identified in the study carried out at different sites of Soalkuchi, a silk village of Assam. The yield of spores from market area was the highest followed by weavers' house. The count was highest in August, September and October and lowest in January. Temperature had little effect of concentration of various spores types whereas the rainfall showed the direct relationship with spore concentration. *Aspergillus*, *Cladosporium*, *Curvularia*, *Penicillium*, *Fusarium*, *Alternaria*, *Mucor*, *Helminthosporium* spores were observed throughout the year at all sites. *Aspergillus* was the dominant type. The airborne fungal spores play an important role in allergic disorders. The record of airmicroflora is very helpful for the diagnosis and treatment of allergic disorders. The airborne microbes cause

the biodeterioration of the environment.

Introduction : -

Aerobiology has developed into an expanding science with interdisciplinary boarders extending to plant pathology, mycology, palynology, biodeterioration and allergy. The aerobiological investigations of the outdoor atmosphere involve in the experiments conducted for the detection of the aero allergenic fungal spores, which have their impact on human health as a part of the general aerobiological experiments. The study of aerobiology has its bearing on various areas of human health and welfare, among which may be mentioned allergy and plant pathogenicity, involving spores which subjected matter of the present investigation. Airborne fungal has been widely considered as major allergens capable of causing asthma, allergic rhinitis and other allergic diseases (Barua, 1961). Diversity of topography, variance

of meteorological and climate condition from place to place is highly reflected in the incident of aero allergens (Blode, 1978).

The present investigation was undertaken to study the incidence and frequency of airborne fungal spores over some selected sites at Sualkuchi, Kamrup district, Assam for a period of twelve months and effect of the meteorological parameters on the prevalence of the airborne fungal spores. Sualkuchi which is known as “Manchester of East” is a famous place for production of “Paat and Muga” (Assam silk) clothes. Sualkuchi is not famous for production of golden silk, but also it is famous for the high density of population compared to other villages. The selected sites are market areas and weavers houses. The pathogenic forms of microbe may cause allergy along with other ailments. So we have considered to study the role of fungal population and its relevance in human health hazard and biodeterioration of the environment.

Materials and Methods : -

Air sampling was conducted over the sites with the help of Burkard Personal Sampler at ten days interval throughout the year (January to December, 2013). The sampler was placed at a height of 5 ft. above the ground level. It was operated for 5 mins. Exposures are made thrice a day --morning, midday and evening. After its exposure, the slide was examined under the microscope. The identification are based on the colour, size, shape of spore

and other important diagnostic features. Spores types are identified upto genus. The identification of the fungal spores was done with the help of published literatures. (Funder 1953, Gilman 1959, Tilak 1989, Nair 1986).

Results and Discussions : -

The number of fungal spore varied in the two sites. 29 different varieties have been recorded from weavers house and 36 varieties from market area. Highest number of fungal spores were counted from market area. The most frequently occurred spore type which eventually contributed to the total airspora were *Aspergillus* sp. (21.74%), *Cladosporium* sp. (16.43%), *Curvularia* sp. (12.13%), *Penicillium* sp. (10.39%), *Furarium* sp. (8.52%), *Alternaria* sp. (8%), *Mucor* sp. (7.89), *Helminthosporium* sp. (6.52%) etc. Among all these *Aspergillus* sp. was found to be the most dominant spore on the air over the two sampling sites. Konger and Barua (1958), Barua (1961), Barua and Chettia(1966), Singh (1985), Sarma and Sarma (1993), Mazumdar and Bhattachajya (2000) had reported similarly.

During the month of August, September and October, the maximum spore count were recorded. This period was seen to the most favourable for growth of variety of microfungi. The minimum number of the fungal types were recorded during the month of January. Temperature had little effect of concentration of various spore types

as where the rainfall showed the direct relationship of the spore concentration.

Table : Showing the Concentration of different Airborne Fungal spores using Burkard Personal Sampler.

Sl. No.	Fungal Spores	Weavers' House Total number of spores	Weavers' House P.C. of total occurrence	Market Area Total number of spores	Market Area P.C. of total occurrence
1.	<i>Aspergillus sp.</i>	550	21.15	716	12.17
2.	<i>Alternaria sp.</i>	166	6.39	426	7.24
3.	<i>Bispora sp.</i>	56	2.15	8	0.14
4.	<i>Botrytis sp.</i>	98	3.77	62	1.05
5.	<i>Cercospora sp.</i>	52	2.00	16	0.27
6.	<i>Chaetomium sp.</i>	-	-	105	1.76
7.	<i>Cladosporium sp.</i>	402	15.46	618	10.51
8.	<i>Corynespora sp.</i>	18	0.69	10	0.17
9.	<i>Curvularia sp.</i>	136	5.23	470	7.99
10.	<i>Drechslera sp.</i>	76	2.92	126	2.14
11.	<i>Epicoccum sp.</i>	4	0.15	6	0.10
12.	<i>Fusarium sp.</i>	148	5.69	466	7.92
13.	<i>Ganoderma sp.</i>	-	-	18	0.31
14.	<i>Helminthosporium sp.</i>	60	2.31	452	7.68
15.	<i>Heretosporium sp.</i>	4	0.15	4	0.07
16.	<i>Lacellina sp.</i>	10	0.38	12	0.20
17.	<i>Leptospeaeria sp.</i>	-	-	96	1.63
18.	<i>Melanospora sp.</i>	-	-	6	0.10
19.	<i>Monilia sp.</i>	-	-	10	0.17
20.	<i>Mucor sp.</i>	138	5.31	464	7.89
21.	<i>Myrothecium sp.</i>	20	0.7	4	0.07
22.	<i>Nigrospora sp.</i>	92	3.54	524	8.91
23.	<i>Penicillium sp.</i>	122	4.69	512	8.70
24.	<i>Periconia sp.</i>	54	2.08	14	0.24
25.	<i>Pithomyces sp.</i>	28	1.08	8	0.14
26.	<i>Pyricularia sp.</i>	46	1.77	34	0.58
27.	<i>Pestalotia sp.</i>	-	-	20	0.34
28.	<i>Rhizopus sp.</i>	62	2.38	40	0.68
29.	<i>Sporidesmium sp.</i>	18	0.69	186	3.16
30.	<i>Stachybotrys sp.</i>	18	0.69	12	0.20
31.	<i>Tetraploa sp.</i>	18	0.69	14	0.41
32.	<i>Tetracoccusporium sp.</i>	-	-	20	0.34
33.	<i>Trichoconis sp.</i>	6	0.17	8	0.14
34.	<i>Trichoderma sp.</i>	120	3.33	334	5.68

35.	<i>Trichothecium sp.</i>	20	0.56	0	0
36.	<i>Torula sp.</i>	14	0.39	6	0.10

The investigation of aerobiology is important in the pathogens of respiratory allergic diseases in human beings. Allergic Bronchiopulmonary *Aspergillois* is the most frequently recognised disease causes by *Aspergillus* sp. The aerospora causes the biodeterioration of the environments. The bioparticles are present inside the buildings such as homes, schools, collages, library, hospitals, industries, warehouses, cattle sheds, caves and other working environments. The contamination of the indoor environment with the presence of microbial populatin and other contaminants certainly possess a major health hazards problems.

Biodeterioration is an entirely different and new field of aerobiology in which the substrate, the organism and the environment interact. The analysis of total population, frequency and abundance of micro flora during manufacturing, packing, storage and transit is necessary. Microbial deterioration of papers like book archival material, manuscripts, decorative wall paper cloth is a serious problem throughout the world in museums, libraries, archives etc. where these materials are placed.

The high percentage of *Aspergillus* (21.15%) and *Cladosporium* (15.46%) observed in the present studies are important from allergic point of view. *Aspergillus* is mostly saprophytic. It is highly allergic and biodeteriorating agent.

Aspergillus spp. are involved in a variety of clinical conditions in human of which *Aspergillus fumigatus*, *Aspergillus flavus* and *Aspergillus niger* are important. Allergic Bronchiopulmonary *Aspergillois* (A. B. P. A) is immunologically complex disease with symptoms very similar to tuberculosis. Fungal infections are most commonly seen in the patients suffering from AIDS.

Cladosporium is also one of the main component of airborne biota causing the biopollution. Spores of this genus constitute predominant type of airspora and have been found to be reported throughout the world and this fungus is also important from allergic point of view. The species of *Penicillium* is also important from allergic point of view. Many fungi are responsible for the diseases of human beings. Some of the serious diseases of human beings e.g. the disease of skin, ear, throat, nose and as well as bronchial and intestinal disorders are caused by various groups of fungi. Many species of *Fusarium*, *Mucor*, *Penicillium*, *Aspergillus*, *Cladosporium* etc. produce toxin called aflatoxins while growing on improperly stored grains and seeds. When such contaminant seeds and grains are consumed by animal and human beings, they cause serious diseases including liver cancer.

Some species of *Mucor* and *Rhizopus* cause fungal diseases of animals

and man (known as *Mucormucosis*) they attack the internal nervous system with fatal consequences. *Mucormycosis* seems to be frequent in patients suffering from diabetes, leukaemia and cancer.

Spores of the fungus namely *Aspergillus*, *Cladosporium*, *Penicillium*, *Alternaria*, *Fusarium* and *Rhizopus* are responsible for biodeterioration. The process of biodeterioration is hasten due to the excessive humidity and poor ventilation. This is a correlation between microbes and environmental conditions, that lead to biodeterioration of the surrounding environment.

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