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A year-round aero mycological study by culture plate technique at Government J. P. Verma P.G. arts and commerce college, Bilaspur (C.G.)

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ABSTRACT

The study of aerobiology has acquired a prominent place in various fields of environmental sciences. Environmental factors are the most important physical factors which affect the fungal population in the air. The present paper deals with the aero mycological studies at Govt. P. G. J. P. Verma Arts and Commerce College, Bilaspur from Feb. 2008 to Jan. 2009. For the survey of aeromycoflora, the method used for the isolation was culture plate method. This involves the principal of sedimentation under the force of gravity. Petri plates containing PDA were exposed for five to ten minutes in air at fortnightly interval from sampling site, the plates were then incubated at 37^{0}C for 3-4 days. After incubation period, isolated fungal colonies were counted and identified with the help of available literature.

Altogether 12 different fungal species were obtained which were purified by single colony isolation method. Amongst these *Aspergillus niger,A. flavus, A. nidulans*, *Penicillium* species were dominant followed by species of *Rhizopus, Trichoderma* etc. Fungal spores showed time trends during the study period, as it was found that lowest number of fungi were isolated in summer season. On the other hand, fungal isolates showed a greater degree of prevalence in winter followed by rainy season. The study also revealed that *Aspergilli* were the common fungi present in the air of the sampling site. Identification of remaining species and physiological characterization is in progress.

Key words: Aeromycoflora, Culture Plate method, Percentage frequency, sedimentation.

INTRODUCTION

Every organism continuously struggle for its existence since the beginning of life. They need food, water and air for their survival but without air survival is beyond imagination. Air is contaminated and gets polluted with dust partials, fungi, pollen grains etc. Fungal spores are most important as they cause various diseases in plants, animals and human beings. Aerobiological studies are aimed at identifying the type of organism, its source and concentration in the atmosphere. Such studies help in controlling and preventing the air-born disease prior to their occurrence.

"Aerobiology", rather a recently developed branch of biological sciences is defined as a "discipline of science, focused on the transport of organisms and biologically significant materials by the atmosphere". The term Aerobiology was coined by Meier, for the studies of airspora such as air-born fungal spores, pollen grains and other micro-organisms. The subject microbiology of atmosphere or Aerobiology was established as a special branch by Meier *et.al.* (1933) of U.S. Air is a carrier of many germs as proposed by Louis Pasture (1861). The term Aerobiology was elaborated by Jacob (1951) to include dispersion of insect, fungal spores, pollen grains, bacteria, virus having impact on all

forms like plants and animals and transported partly or wholly by the atmosphere. It is an interdisciplinary branch of science which is closely linked with other discipline like mycology, microbiology, ecology, metrology environmental science, medicine etc. Nilson (1992) defined "Aerobiology" as an interdisciplinary and limitless science. It is a scientific and multidisciplinary approach focused on the transport of organism and biologically significant material- Edmonds (1979).

Fungi are cosmopolitan in distribution. These constitute most fascinating group comprising of more than 1, 00,000 species. Air does not serve as a habitat, only, fragments and spores of fungi adapted for aerial dispersal, constitute the fungal aerospora. The composition of air flora is governed only by physical factors of the moving air and not by any nutritional factors. Aerobiological studies in different aspects related to environment have been studied by different authors like Pande (1976), Jadhav and Tiwari (1995).

MATERIAL AND METHODS

For the survey of Aeromycoflora, the method used for isolation was culture plate Method. This involves the principle of sedimentations under the force of gravity. This investigation was carried out at Govt. J. P. Verma P. G. Arts & Commerce College, Bilaspur. The medium used for isolation was potato dextrose agar (PDA) medium. 30mg/ liter streptomycin was added to cool molten culture medium before pouring into sterilized petriplates to avoid bacterial contamination (Tiwari, 1977). Petri plates containing PDA were exposed for five to ten minutes in air at fortnightly interval from sampling place. The plates were brought to the laboratory and incubated at $37^0C \pm 1^0C$ for 6-7 days. After incubation period isolated fungal colonies were counted, identified with the help of available literature and the percentage of frequency and abundance of aeromycoflora was calculated by using standard formula (Tiwari, 1977: Jadhav and Tiwari, 1994).

The ecological and metrological study is expected to being useful source of information regarding air-borne fungal spores. The quality and quantity of fungal spores vary in different geographical areas and also in different seasons; therefore it is essential to study the airspora in different season.

RESULTS AND DISCUSSION

During present investigation, 12 fungal species representing different group of fungi were observed growing on petriplates. The data of prevalence of fungal colonies on petri- plates were recorded continuously for 12 month from January to December, 2008. Temperature, the major environmental factor, was found to play an important role in determining increase and decrease in the fungal population. The outcome of the investigation reveals that there is no spore free season in the city of Bilaspur (C.G.), whilst fungal population varies from season to season.

It was observed that the highest density of fungal spores in air was in the month of December. This is likely to be due to the reason that for most Kharif crops, harvesting is performed in this month. The spores present on plants of these crops might be disseminated causing increase in the aerospora. We found that winter season proved to be most favourable for the growth of fungi. Similar observation have been made by Sreeramulu and Ramalingam (1964) and Kamal and Singh (1975). Pandit and Singh (1992), Tilak and Vishwe (1975) and Tiwari and Sahu (1989) have also reported that environmental factors are the most important physical factor which affect the fungal population in the air.

As described in Table -1, least number of fungal species was isolated in summer season. The reason may be attributed to the prevalence of high temperature in these months. The temperature above 40^0C usually not favours fungal growth on any substratum. Conidiation and sporulation may also be affected adversely. All these lead to less number of fungal spores in the air during summer season. In the present investigation the isolation and characterization of fungal flora from air of the area has been attempted. Some physiological and biochemical aspects of these fungi may also be explored in order to understand the hither to unknown mechanisms of growth and development of these fungi.

Table 1: Prevalence fo fungi species isolated from air in the year 2008

Number of colonies* in different monts

S.No	Fungal species	Jan	Feb	March	April	May	Jun	July	August	Sep.	Oct.	Nov.	Dec.	Total
1.	Rhizopus species	20	18	9	8	10	9	13	16	15	18	18	20	174
2.	Aspergillus flavus	23	21	9	8	8	10	11	16	16	18	20	26	186
3.	Aspergillus fumigatus	20	19	19	10	9	7	7	17	17	20	21	24	190
4.	Aspergillus nidulans	22	21	18	11	13	8	14	15	16	19	19	22	198
5.	Aspergillus niger	23	20	18	12	12	10	14	17	16	19	20	25	206
6.	Aspergillus ochraceous	19	15	5			8	7	8	8	7	18	19	114
7.	Aspergillus parasiticus		8		10	7	10	9	12	11	19	19	20	125
8.	Aspergillus terreus	19	18	17		9	13	16	16	17	17	18	19	179
9.	Penicillium funiculosum	22	23	19	16	6	4	6		19	19	17	21	172
10.	Penicillum species	22	19	17	12	13	13	11	16	17	18	19	22	192
11.	Talaromyces species				19	6	4			16	16			61
12.	Alternaria alternata	5	6	4	4	7	15	14	12	10		16	19	112
13.	Cladosporium cladospoirides	25	21	17	5				5	19	18	26	28	164
14.	Curvlaris lunato	5	10	3	6	6	4	9	7	11	12	12	14	99
15.	Fusarium moniliforme	12	15	15	13		4	5	5	7	7	8	14	105
16.	Fusarium oxysporum											6		6
17.	Fusarium pallidoroseum	4	2				2			8	5	21	6	48
18.	Fusarium solani	4	6								4		4	18
19.	Macrophomina phaseolina	4	2				1	2	2			6	8	25
20.	Myrothecium roridum											6	6	12
21.	Paecilomyces varioti	6	7	1	2	4	5	4	4			8	8	49
22.	Phoma exigua	3	3	2				3	3			5	6	25
23.	Trichoderma viride	1	2	1					3	4	5	6	6	28
24.	Torula species	4	3	1				3					5	16
25.	Rhizoctonia salani	3								3				6
		266	259	175	136	110	127	148	174	230	241	309	342	2517

*Total of 5 pertriplates from each sampling site

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