

Aeromycological study of monument in relation to environmental factors

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Abstract

Present investigation focuses on mycobial survey of ancient monument of Chhattisgarh and study carried out March 2010 to February 2011. During the present investigation period it was observed that fungal population was varying from season to season and month to month. Environmental factor play an important role for the distribution of the fungal spores. The Fungal population is not homogenous throughout the year and shows seasonal variation. It was observed that maximum fungal population was observed in winter season, due to favourable temperature and relative humidity, moderate in rainy season and minimum number of fungal population was recorded in summer season, possibly due to unfavourable temperature and relative humidity for mycoflora.

Keywords: Chhattisgarh, *Aspergillus*, Biodeterioration, Seasonal variation.

INTRODUCTION

Aerobiology is often considered the microbiology of atmosphere. The term "Aerobiology" was used as a collective term for the studies of airspora like air borne fungal spores, pollen grains and other air borne microorganisms. Aerobiology is a discipline that takes into account the atmosphere, the transport of bioparticles through it which may cause biodeterioration and diseases to humans, plants and animals. It deals with the investigation of air borne bioparticles of both indoor and outdoor environments which are composed of bacterial and fungal spores, pollen grains, microscopic fragments of plants, animals small insects, algae etc. Once the bioparticles become airborne they are free to move in environment as biological active materials in less concentration as these are carried along the air current. While such materials becomes highly concentrated in indoor environment, which are not properly ventilated.

The air borne biological particles settles down due to gravity. Fungal spores if settled on surface having inorganic salts (stones etc.) or organic material will germinate. The growth of fungi on stones or organic matters has huge consequences. Old buildings and monuments are made of stones. When the fungal spores settle on these, they grow and cause discolouring and sometimes break down of these structures likewise articles, paintings and wood work provide organic matter to the growing fungi. The fungi growing on such articles destroy the value of these articles. There is a strong correlation between aerobiology and biodeterioration of works of art considering that the air is the main vehicle for the dispersion of microorganisms. The growth of microorganisms on works of art depend on characteristics of microorganisms, the chemical

composition of the substrate, the gas present in the air and on climatic conditions, especially relative humidity and temperature. Eco-management is necessary and need of the present hour. It helps in maintaining a balance between control practices and ecology of the place. It also helps in removing unwanted microorganisms which have gained access to the indoor environment without damaging the ecology and the health of the individuals. The present paper deals with the mycological survey of ancient monument with environmental factors.

MATERIALS AND METHODS

During the investigation period PDA media was used for the isolation of microorganisms. Sample were collected from the surface of monument (situated near Raipur) of all the months in the sterile polythene bags and prepared the solution in sterilized distilled water. Few drops of sample pour in the petridishes and kept this petridishes at $28 \pm 1^\circ\text{C}$ for 7 days for incubation [1]. At the end of incubation period fungal colonies were counted, isolated and identified with the help of available literature and finally send this culture to authentic authority: National centre of fungal taxonomy Delhi for identification.

RESULTS AND DISCUSSION

Seasonal variation affects aeromycoflora of the area. Fungal spores are not equally distributed in the environment their distribution varies according to geographical location and meteorological conditions. The climate of Raipur city divided by three seasons; Rainy season (July–October), winter season (November– February) and summer season (March–June).

During investigation period, it is also observed that the maximum fungal species are recorded in winter season, moderate fungal species in rainy season and minimum fungal species are recorded in summer season.

14 fungal floras were isolated from sampling site. The fungal species were *Cladosporium* sp. *Fusarium* *Mycelia sterilia* *Aspergillus*, *Cladosporium*, *Mucor*, *Penicillium*, *Rhizopus*, *Trichoderma*, *Emericella nidulans* species were observed. It is found that maximum percentage contribution is observed for *Aspergillus niger*,

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A. fumigatus, *Cladosporium cladosporioides* followed by *A. versicolor*. On the contrary, minimum percentage contribution (0.55) is observed for *Dictyochlamydospora*, *Chaetomella raphigera*. The results of present investigation reveal with various work done by researchers. Similar results reported at Raipur (C.G.) by Agrawal (2010) [2]. Endolithic lichen and fungal growth can be used to describe the ecophysiological adaptations of them to the environmental extremes of the rock as studied by Bungartz et al. (2004) [3]. The biodiversity of soil crust biota from different geographical regions is rather dissimilar and their determination is only rarely based on cultured material in the case of Cyanobacteria, algae and fungi [4]. It is also seen the Biogenic weathering is caused by the action of lithobiontic organisms. Homogeneous carbonates are predominantly colonized by endolithic species that actively penetrate the rock substratum independent of already existing pores or fissures. The organisms construct a system of ducts and cavities by active dissolution of the substratum [5]. Fungi are especially concentrated in stone crusts. They are able to penetrate into the rock material by hyphal growth and biocorrosive activity, due to excretion of organic acids or by oxidation of mineral-forming cations, preferably iron and manganese. Their deterioration activities also include discoloration of stone surface, due to the excretion of melanin by dematiaceous fungi [6]. Biological and mycological investigations are very important part of good conservation and cannot be ignored in modern conservation concept

which includes close collaboration between art and science.

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