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Mycological survey of the Bhandedwal temple, Arang, Chhattisgarh

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ABSTRACT

Biodeterioration processes result from complex interactions of surface-invading microbes with each other as well as with the surface material. Fungal ability in production of pigments and organic acids have crucial role in discoloration and degradation of monuments. Air acts as a vehicle for the dispersion of microorganisms. It introduces into air from different sources *i.e*. soil, water, organic waste of man, plant leaves, sneezes and cough. This investigation focuses on mycological survey of The Bhandedwal Temple of Arang. The 19 fungal floras were isolated. Aspergillus *Alternaria, Penicillium,Curvularia,Cladosporium,Fusarium,Mucor,Rhizopus ,* were dominant. During present study 165 fungal colonies were observed.

Key words: Biodegradation, cultural heritage, fungi.

INTRODUCTION

Ancients monuments are regularly affected by the continuous colonization of micro-organisms especially bacteria, cyanobacteria, yeast, some algae species and various fungal species. (Gorbushina *et al*., 2004). Fungi has greater role in the biodeterioration of monuments (Burford *et al*., 2003). The phototrophic microorganisms are common inhabitants of monuments. Opportunistic species of cyanobacteria and chlorophytes, present in soils and in the air, are commonly found on the surfaces of monuments (Šimonoviåova, 2004).

Chhattisgarh is the land of ancient culture which has lots of ancient monuments, temples and fort Microbial activity can have an important impact on the durability of building materials. It is important to understand these activity of micro- organisms in order to select appropriate treatment strategies for the repair and restoration of buildings and monuments. (Gaylarde *et al.*, 2006). The harmful effect by the colonisting of micro-organism on the monuments is scientifically known as biodeterioration. The monuments which are made of value ancient stones like marbles, granite and other have greater get more damaged from fungal colonizing (Winkler 2002). Blackening of rock and architectural surfaces by soot and dust has attracted attention of scientists and conservators for some time.Thus the biodeterioration of ancient buildings and monuments depend upon many factors which includes environmental factors like light, moistures, weather, temperature etc type of micro – organism that is its potential towards the colonization in the surrounding environments, materials of the monuments. etc. all these equally contribute the biodeterioration of any monuments. This investigation focuses on mycological survey of The Bhandedwal Temple of Arang.Bhandedwal Temple in Arang is a true manifestation of the excellent structural skills of the ancient Jain rulers who once

dominated the land of Chhattisgarh. The tirthankars are the main symbol of the devotional figures of Jainism. Bhandedwal Temple possesses three ecstatic black stone sculptures of these tirthankars.

MATERIAL AND METHODS

Sample were collected from Bhandedwal temple and stored in 4°c. Potato dextrose agar (PDA):- media was used for obtaining pure culture from the sample of monuments. PDA attends for potato dextrose agar, in this nutrient media potato and dextrose are the source of carbohydrates. Agar is used as solidifying agent. Each sample was repeated in triplicate. Then the Petri plates, broughted into the laboratory and incubated at 26±1^{0}c. for seven days. After 7 days colonies were observed. The fungi were identified from National center of fungal taxonomy Delhi. Percentage contribution of fungal species was calculated.

RESULTS AND DISCUSION

19 fungal flora were identified analyzed samples from all (Table 1). The fungal species were *Alternaria* sp. , *Cladosporium oxysporum, Fusarium* sp.,*Mycelia sterilia Aspergillus, Penicillium, Curvularia, Cladosporium, Mucor, Rhizopus, Trichoderma* Species were observed. It is found that maximum percentage contribution is 0bserved for *Cladosporium* sp.(9.09) followed by *Alternaria* sp.(7.27) *Aspergillus niger* (8.48), *A flavus*(6.66), *A fumigates* (7.87), *Curvularia lunata(* 6.66)On the contrary, minimum percentage contribution (1.81) is observed for *Rhizopus sp.* .The results of present investigation revel with various work done by researchers. It was studied by Alka Jain et al., (2008) that Excessive moisture in building materials supports microbial growth. 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). 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. (Ajit Varma and Francois Buscot 2007). 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. (Hoppert *et al*., 2004).

Table 1 : % Contribution of flora

S. No.	Name of fungi	% contribution
1	*Alternaria sp.*	7.27
2	*Aspergillus flavus*	6.66
3	*A. fumigatus*	7.87
4	*A. nidulans*	4.24
5	*A. niger*	8.48
6	*A.Scalrotium*	4.84
7	*A. temari*	4.24
8	*Cladosporium oxysporum*	9.09
9	*Curvularia lunata*	6.66
10	*Curvularia clavata*	3.63
11	*Fusarium sp.*	5.45
12	*Mucor sp.*	4.84
13	*Mycelia sterilia (white)*	4.24
14	*Paecilomyces varioti*	4.84
15	*Penicillium chrysogenum*	4.24
16	*Penicillium Sp.*	2.42
17	*Rhizopus sp.*	1.82
18	*Trichoderma viride*	3.03
19	Unidentified	5.45

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