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REGULAR ARTICLE

BIODETERIORATION OF ANCIENT MONUMENT (DEVARBIJA) OF CHHATTISGARH BY FUNGI

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SUMMARY

Chhattisgarh is the land of ancient culture which has lots of ancient monuments, temples and fort. Every nook and corner of Chhattisgarh has traditional heritage. Numerous factors affect the stone durability. Stone surfaces are conti- nuously exposed to physical, chemical and biological degradation. Physical, chemical, and biological agents act in co-association, ranging from synergistic to antagonistic, to the deterioration. Among biological agents miroorganisms have critical importance, in stone deterioration. They can cause various damages on the stone surface.

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 Sita Devi Temple of Devarbija,Durg,Chhattisgarh. The 15 fungal floras were isolated. *Aspergillus, Penicillium, Curvularia, Cladosporium, Fusarium, Mucor, Rhizopus*, were dominant. During present study 88 fungal colonies were observed.

Key words: Biodegradation, Devarbija, Fungi

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1. Introduction

The harmful effect by the colonizing of micro-organism on the monuments is scientifically known as biodeterioration. Microbial activity can have an important impact on the durability of building materials. 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 biodeterioration of ancient buildings and monuments depend upon many factors which includes environmental factors like light, moistures, weather, temperature& type of micro – organism. All these equally contribute the biodeterioration of any monuments. 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 (Š i m o n o v i å o v á,2004).

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 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. This investigation focuses on mycological survey of The Bhandedwal Temple of Devarbija,Durg,Chhattisgarh.

2. Material and Method

Sample were collected from Devarbija 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, brought 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.

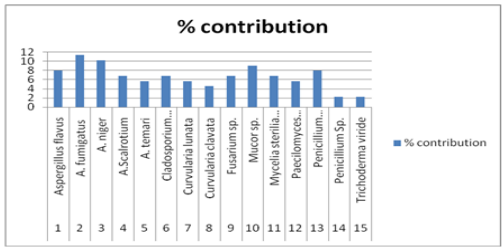
3. Results and Discusion

During present investigation 15 fungal flora were identified (Table 1& 2). The fungal species *Cladosporium oxysporum, Fusarium* sp.,*Mycelia sterilia Aspergillus, Penicillium,Curvularia,Cladosporium ,Mucor ,Tr ichoderma* Species were observed. It is found that maximum percentage contribution is 0bserved for *A.fumigatus* (11.36) followed by *Aspergillus niger* (10.22), *Mucor* sp (9.09), *A flavus*(7.95), *Curvularia lunata(* 5.68). On the contrary, minimum percentage contribution (2.27) is observed for *Penicillium* sp & *Tricoderma viride* .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	*Aspergillus flavus*	7.95
2	*A. fumigatus*	11.36
3	*A. niger*	10.22
4	*A.Scalrotium*	6.81
5	*A. temari*	5.68
6	*Cladosporium oxysporum*	6.81
7	*Curvularia lunata*	5.68
8	*Curvularia clavata*	4.54
9	*Fusarium sp.*	6.81
10	*Mucor sp.*	9.09
11	*Mycelia sterilia (white)*	6.81
12	*Paecilomyces varioti*	5.68
13	*Penicillium chrysogenum*	7.95
14	*Penicillium Sp.*	2.27
15	*Trichoderma viride*	2.27

Table 2 Fungal species



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