

Fungi Associated with Deteriorations of Painted Wall Surfaces: Isolation and Identification

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Abstract: The aim of the present study the deterioration of painted wall surfaces in and around Mohanavaram Village in Vellore District. Samples were processed for fungal isolation using the potato dextrose agar. The conventional methods of swabbing and streaking were used. Pure culture of isolates organisms were identified and characterized using standard microbiological technique. The fungus were isolated from deterioration of painted wall surfaces yielded 10 isolates representing 7 different types of fungal species viz., *Penicillium sps*, *A.niger*, *Rhizopus oryzae*, *Mucor*, *Trichophyton*, *Alternaria alternate* and *Epidermophyton floccosum*. The use antibiotic coated paints would possible to prevent the paint denaturation, improve the shelf life and retain the beauty of the wall paints.

Key words: Deterioration, Fungal, Paints, Denaturation, Shelf life.

1. Introduction

Paint is a fluid applied to surface in layers forming a coloured solid coating. It is a fluid with viscosity, drying time and flowing properties developed by formulation. It also contains a wide range of organic and inorganic constituents and provide different ecological niches that may be exploited by a large variety of microbial species[1] of the characterization of the microbial population present on painted surfaces has been limited to select groups of microorganisms. This often been limited to fungi[2], bacteria or cyanobacteria and eukaryotic algae[3].

During rainy season fungi grow on painted walls and degrade the paint works. These effects could be as a result of toxic waste produced by the fungi. Certain fungal spores which are present in air and are taken in by people that are allergic and cause irritation to varying degrees of intensity which may even result in illness[4]. There are many sources of indoor pollutions .This include combustion sources such

as gas, kerosene, wood and candle and as well as outdoor sources radon pesticides. These pollutants weakened the paint chemical composition and hence incidence of fungal growth might be possible and there by deterioration occurs. High pollutant concentration could remain in the air for longer periods after some of these activities. Hence increase the chance of fungi growth on buildings [5]. The aim of this study was therefore to isolate and identify the predominant fungi deteriorating the walls of painted buildings.

2. Materials and Methods

2.1. Collection of samples

The samples were collected from different painted walls of the buildings in and around Mohanavaram Village in Vellore District. The failing paint were scratched out from the buildings aseptically using a sharp sterilized needle into a sterilized polythene cover and was enveloped immediately to avoid contamination or inversion of other microbes or fungi material into the collected samples[6] . Each sample

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was enveloped and labelled approximately by indicating the sample collected building. The collected samples were transported and stored at 4⁰c for further processing. The samples were processed for fungal isolation, identification and characterization.

2.2. Isolation of fungus

1 gm of collected samples was dissolved in 10 ml of distilled water and then samples were streaked on the potato dextrose agar (PDA) for the growth of fungal colonies. Then the inoculated plates were incubated at 37c for 72 hours.

2.3. Identification of fungal isolates

The pure culture of fungus isolated from the various samples were identified to their specific genus on the basis of morphological and microbiological characteristics using suitable media and using the most updated keys for identification of fungus[7].

3. Results

The present study revealed the level of deterioration of painted surfaces by fungi. Of the 15 samples subjected to microbiological analysis, all the samples obtained from various sources were contaminated with fungi. The culture from the paint surfaces collected yielded 10 isolates representing 7 different types of fungal species viz., *Penicilium sps*, *A.niger*, *Rhizopus oryzae*, *Mucor*, *Trichophyton*, *Alternaria alternate* and *Epidermophyton floccosum* (Table 1).

4. Discussion

Fungi are essential for the survival of our global ecology but they may pose a significant threat to the health of the occupants when they grow in our buildings. During the service life of buildings, natural aging and eventual damage of materials due to different biological, physical, and chemical processes can take place [6]. Aging of the materials is one aspect of environmental processes and involve different chemical, mechanical and biological reactions of the materials. Biodeterioration (i.e. mould, decay and insect damage in buildings) is caused when moisture exceeds the tolerance of structures which may be a critical factor for durability and usage of different materials[8,9]. Different organisms e.g. bacteria, fungi and insects, can grow a live in the building materials; microbiologically clean buildings probably do not exist, as some contamination begins as early as during the construction phase itself. Discoloration of concrete or paint on walls or nearby surfaces is usually an indication of presences of mould colonies. Fungi are requires various favourable conditions for their growth in the buildings. Some of these conditions are favourable temperature (0-25°C), nutrients, oxygen and water.

Table: 1 Cultural and morphological characteristics of the fungal isolates

Sample	Growth at 25 ⁰ C	Spore Formation	Microscopic Observation	Fungal sp
A	+	Conidiospore	Septate hyphae	<i>Penicilium A.niger</i>
	+	Conidiospore	Septate hyphae	<i>R.oryzae</i>
	-	Sporangiospore	Septate hyphae	<i>Mucor</i>
B	-	Conidiospore	Septate hyphae	<i>A.niger</i>
	+	-	Macrocanida	<i>Trichophyton</i>
	+	Conidiospore	Septate hyphae	<i>Penicillium</i>
C	+	Conidiospore	Macrocondia	<i>A. alternate</i>
	+	Chlamydospore	Septate hyphae	<i>E.floccosum</i>
	+	Conidiospore	Septate hyphae	<i>A.niger</i>

Keys: A- Sunnambu, B- White cement, C- Distempers

The growth of mould fungi on material on building is often an early indication of increased humidity and moisture levels. Problems caused by mould fungi are mainly discoloration, odour and health problems [10]. Following are the useful suggestions recommended in maintaining and preserving the painted surfaces of wall from deterioration.

1. Improper plumbing works causes leakage of water in the wall and this moist condition is a suitable environment for the growth of fungi, which denatures or destroys the paint or reduces the paint shelf life. Thus taking proper care during plumbing works can very well help in retaining the quality, colour and life of wall paints.
2. Avoiding the stagnation of water in the terraces and removing them without having contact with the walls can also help in maintain the quality of wall paints.
3. Collection of garbage at the corners of the walls has an increased denaturing effect on wall paints; this also could be avoided in preventing the degradation of wall paints.
4. Thus using antibiotic coated paints would prove useful in the above mentioned condition to prevent the paint denaturation, improve the shelf life and retain the beauty of the wall paints and mainly prevent or defend the paints from microbial effect.

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