Isolation and Study of Myco and Micro Diversity in Mangrove Forest in Mumbai Suburban Region

Mr. Udaybhan Yadav[1], Mr. Kunal Thakur[2], Mayur Patil[3], Sakshi Singh[4]
Coordinator, Department of Microbiology, ZSCT's Thakur Shyamnarayan Degree College, Kandivali, Mumbai[1]
Assistant Professor, ZSCT's Thakur Shyamnarayan Degree College, Kandivali, Mumbai[2]
ZSCT's Thakur Shyamnarayan Degree College, Kandivali, Mumbai[3,4]

Abstract: *Bacteria has a main role in the food chain and waters productivity. Bacteria in the Mangrove ecosystem mostly are from litter, sediment, and sea waters. Mangrove ecosystems provide important ecological benefits and eco-System services, including carbon storage and coastline stabilization, but they also suffer great anthropogenic pressures. Microorganisms associated with mangrove sediments and the rhizosphere play key roles in this ecosystem and make essential contributions to its productivity and carbon budget. Understanding this nexus and moving from descriptive studies of microbial taxonomy to hypothesis driven field and lab studies will facilitate a mechanistic understanding of mangrove ecosystem interaction webs and open opportunities for microorganism mediated approaches to mangrove protection and rehabilitation. Such an effort calls for a multidisciplinary and collaborative approach, involving chemists, ecologists, evolutionary biologists, microbiologists, oceanographers, plant scientists, conservation biologists, and stakeholders, and it requires standardized methods to support reproducible experiments.*

Keywords: Mangrove ecosystem, anthropogenic pressure, rhizosphere, microbial taxonomy, rehabilitation etc

I. INTRODUCTION

Mangroves, intertidal forests along tropical and subtropical coasts, are hot spots of productivity and biodiversity. These ecosystems yield valuable services for humanity, including cultural and religious value, habitat for fisheries species, plant products including timber, filtration of terrestrial runoff, and coastline stabilization against storm impacts. Globally, mangroves are significant carbon sinks, mitigating climate change by removing atmospheric greenhouse gases through sequestration of organic matter in above and below ground biomass.

Pneumatophores are aerial roots derived from subterranean roots that enable plants to access air in waterlogged soil habitats. It is most commonly found in saline mudflats, mostly in mangroves, bald cypresses, and gyms. Mangrove-breathing roots are also found there. Figs have lateral roots that grow outwards from the mud and water and serve as oxygen intake sites for their primary roots in the water. The bark of trees has tiny openings called lenticels. Many species have these roots, which can also be referred to as the knee roots or respiratory roots.Those organs are responsible for absorbing oxygen. The soil provides oxygen for respiration in plants. A salt marsh forms when salty seawater is washed over land during high tides in coastal areas. Because of this, salt marshes have very little oxygen in the soil. There are many pores on pneumatophores, which are breathing roots. In order to perform this function, the mangrove plants possess from the air. Pneumatophores absorb oxygen, which helps in the respiratory system as well as for the roots to grow underground. The pneumatophores in mangrove plant roots help them to absorb gases, such as nitrogen, and nutrients, such as iron, from poor soil. In spite of being submerged in water, mangrove plants utilize the gases stored within their pneumatophores.

For roots submerged in water, pneumatophores facilitate the exchange of oxygen and carbon dioxide through lateral roots. Plants form these structures when roots cannot be respired normally because oxygen is insufficient for their roots. Root respiration is made possible by an abundance of breathing pores or openings called lenticels that allow gas exchange. Roots are modified in order to allow their roots to breathe. This type of root can be found mainly in swampy and muddy areas and is a characteristic of many mangrove species, including *Avicenniagerminans, Lagunculariaracemosa, Ludwigia reopen, and Lagunculariaracemosa.*

Rhizophora is a genus of tropical mangrove trees, sometimes collectively called true mangroves. The most notable species is the red mangrove (Rhizophora mangle) but some other species and a few natural hybrids are known. *Rhizophora* species generally live in intertidal zone which are inundated daily by the ocean. They exhibit a number of adaptations to this environment, including pneutomatophores that elevate the plants above the water and allow them to respire oxygen even while their lower roots are submerged and a cytological molecular "pump" mechanism that allows them to remove excess salts from their cells. The generic name is derived from the greek words ριζα (*rhiza*), meaning "root," and φορος (*phoros*), meaning "bearing," referring to the stilt-roots.

II. MATERIALS AND METHODS

Suspensions of all the three soil samples were prepared using saline. Nutrient Agar plates was used for the isolation of microorganisms.

For preparation of nutrient agar, 28gms of nutrient agar was added to 1l distilled water and the medium was sterilized at 120°c and 15 lbs pressure. 20 ml of sterilized NA was poured into sterile petri plates and medium was allowed to cool till solidified.

Samples are collected from the location of Goraimangrove area.

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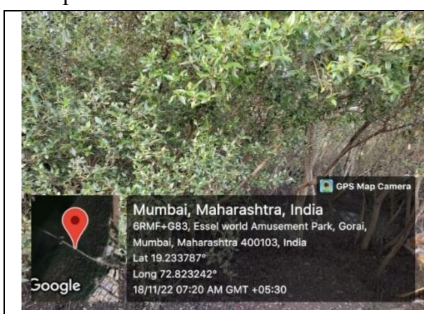
<td>
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<td>Location:Samples collected from the LOW tide of mangrove area</td>
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<td>Location:Samples collected from the HIGH tide of mangrove area</td>
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PhotoPlate.1: Sample Collection at Mangrove Area

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<td>Saline Sample Preparation of LTA for Inoculation</td>
<td>Saline Sample Preparation of MTA for Inoculation</td>
<td>Saline Sample Preparation of HTA for Inoculation</td>
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Photo Plate.2: Saline Sample Preparation of for Inoculation

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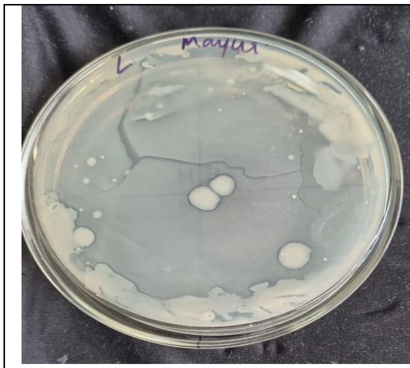
III. OBSERVATION

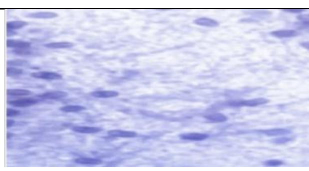
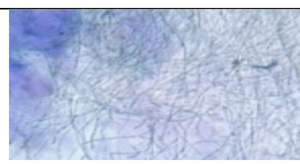
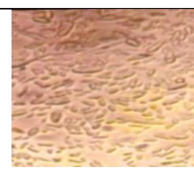
		
Growth of Microorganism in Saline Sampleof LTA after Inoculation	Growth of Microorganism in Saline Sample of MTA after Inoculation	Growth of Microorganism in Saline Sample of HTA after Inoculation

PhotoPlate.3: Growth of Microorganism in Saline Sampleafter Inoculation

IV. RESULT AND DISCUSSION

This was in accordance with the research of Yulma et al., that there were bacterias genus found in sediments in the Mangrove, *namely Bacillus, Enterobacteria, Listeria, Micrococcus.*

The diversity of sedimentary microorganism communities was very high. This is due to the content of sediments supporting and assisting in the formation of aerobic and anaerobic microenvironment cooperation. For example, a decrease in oxygen levels due to microorganism activity in a room rich in organic matter will form an anaerobic microenvironment that supports facultative and obligate anaerobic microorganism activities. This causes the emergence of groups of microorganisms with certain specific physiological properties that are in accordance with the conditions of the microenvironment.

			
Bacillus	***Enterobacteria***	***Listeria***	***Micrococcus***

PhotoPlate.4: Growth of Microorganism- Types of Bacterial Genus observed under Microscope.

COLONY CHARACTERS AND IDENTIFICATION OF BACTERIA

Sr. No.	Colony Characteristic	Bacteria
1	Rod-shaped and Gram-positive, when cultured on ordinary nutrient agar, the morphology circular colony of this bacteria is rough, opaque, fuzzy white or slightly yellow with jagged edges.	*Bacillus*
2	Blueishgreyin color with a shiny texture. It often looks like mucus or a cloudy film over the whole surface of the plate. colony is slightly raised and has an entire, fixed margin and a steady growth pattern, creating concentric growth rings in the colony.	*Enterobacter*
3	Yellow colored colonies have appeared, Round, smooth, convex, glistening with entire edge.	*Micrococcus*
4	Grey to off white coloredappeared, Colonies have a low-convex profile on nutrient agar. Colonies appear bluish-grey by normal illumination.	*Listeria*

The bacteria found in the most dominant mangrove forest area was the Bacillus bacteria. Bacillus was one of the endophytic bacteria found in plant tissue so that this bacterium could be found in all mangrove vegetation.

V. CONCLUSION

Mangrove regions are unique swampy regions with water region being alkaline in nature and sediment or soil region having a neutral to slightly acidic pH. Since mangrove environment is prevalent to stress conditions such as salt stress, microorganisms growing under such stress conditions could have a potential for bioremediations programmes. The soil isolates were halo-tolerant and could tolerate relatively high concentrations of heavy metals. Mangroves are saline coastal ecosystem rich in Carbon and other nutrients. They harbor large numbers of population of unique bacteria. The present study reveals the mixed population of bacteria of Gorai mangroves area. Further studies on these organisms and more evaluation of their stress tolerance could make them applicable for various industrial applications.

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