

Abstract of the PhD Thesis

BENEFICIAL ASPECTS OF SELECTIVE ENDOPHYTIC BACTERIA ISOLATED FROM *MORINDA L. SPECIES*

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Endophytes are among the richest sources of natural compounds, having beneficial properties like antimicrobial, antioxidants, and anticancer. Endophytes residing in the medicinally useful plant possess the host characters of similar bioactive compounds showing various biological activities. So, the entire thesis comprises the study of beneficial aspects of endophytic bacteria from the medicinal plants belonging to *Morinda L.* species. A total of 15 different strains were isolated, among which 9 different strains from the leaves of *Morinda citrifolia* and 6 from *Morinda pubescens*. Phenotypic identification and physiological parameters of the isolates were studied. Further identification of isolates was made genotypically by the 16S rRNA gene sequencing method. The metagenomic study of *M. pubescens* using the Illumina Hiseq sequencing protocol reports the vast diversity of endophytic bacterial communities. Eight bacterial strains out of fifteen isolates were chosen for the biological study selected on the basis of viable sub culturing and species difference. Qualitative chemo-profiling of the isolates were carried out using GC-MS chromatography technique.

Bacteria mediated iron oxide nanoparticles synthesis and characterization using UV-Vis spectroscopy, FTIR, EDAX, SEM, TEM and XRD in *Exiguobacterium aurantiacum* NMC1 strain was carried out. The characterization indicates the synthesized nanoparticles have a surface plasmon resonance (SPR) peak with maximum absorbance at 293.50 nm, characteristic of iron nanoparticles. Furthermore, microscopy studies (SEM and TEM) specify that nanoparticles are spherical in shape with diameters between 9.05 nm and 51.21 nm. Additionally, XRD analysis confirms the synthesized nanoparticles are γ -Fe₂O₃ structured, known as Maghemite. The in vitro antimicrobial, antioxidant and cytotoxicity capacity of bacterial isolates were analyzed. On assessment of in vitro cytotoxic study two bacterial isolates *Brevundimonas vesicularis* JAP (NMC15) and *Bacillus vietnamensis* SMC (NMT07) having an IC₅₀ value below 50 μ g/mL were selected for in vivo study. Animal study of the isolates NMC15 and NMT07 showed noticeable anti-inflammatory and antitumor activity. In addition, hematological parameters and histopathology study of tumor were conducted. The results are discussed and the major conclusions were given in the thesis as a separate chapter.

Keywords: Endophytic bacteria, nanoparticle, antimicrobial, antioxidant, anti-inflammatory and antitumor