

## Excavation of Phylogenetically Diverse Bioactive Actinobacteria from Unexplored Regions of Sundarbans Mangrove Ecosystem for Mining of Economically Important Antimicrobial Compounds

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**Abstract :** Newly emerged phyto-pathogens and multi drug resistance have been threatening the world for last few decades. Actinomycetes, the most endowed group of microorganisms isolated from unexplored regions of the world may be the ultimate solution to these problems. Thus the aim of this study was to isolate several bioactive actinomycetes strains capable of producing antimicrobial secondary metabolite from Sundarbans, the only mangrove tiger land of the world. Fifty four actinomycetes were isolated and analyzed for antimicrobial activity against fifteen test organisms including three phytopathogens. Nine morphologically distinct and biologically active isolates were subjected to polyphasic identification study. 16s rDNA sequencing indicated eight isolates to reveal maximum similarity to the genus streptomycetes, whereas one isolate presented only 93.57% similarity with Streptomycetes albogriseolus NRRL B-1305T. Seventy-one carbon sources and twenty-three chemical sources utilization assay revealed their metabolic relatedness. Among these nine isolates three specific strains were found to have notably higher degree of antimicrobial potential effective in a broader range including phyto-pathogenic fungus. PCR base whole genome screen for PKS and NRPS genes, confirmed the occurrence of bio-synthetic gene cluster in some of the isolates for novel antibiotic production. Finally the strain SMS\_SU21, which showed antimicrobial activity with MIC value of 0.05 mg ml<sup>-1</sup> and antioxidant activity with IC<sub>50</sub> value of 0.242±0.33 mg ml<sup>-1</sup> was detected to be the most potential one. True prospective of this strain was evaluated utilizing GC-MS and the bioactive compound responsible for antimicrobial activity was purified and characterized. Rare bioactive actinomycetes were isolated from unexplored heritage site. Diversity of the biosynthetic gene cluster for antimicrobial compound production has also been evaluated. Antimicrobial compound SU21-C has been identified and purified which is active against a broad range of pathogens.

**Keywords :** actinomycetes, sundarbans, antimicrobial, pks nrps, phyto-pathogens, GC-MS

**Conference Title :** ICMGM 2016 : International Conference on Molecular Genetics and Microbiology

**Conference Location :** London, United Kingdom

**Conference Dates :** February 25-26, 2016