ABSTRACT

Isolation and Characterization of Actinobacteria with Antibiotic Potential from Jamaica

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Actinobacteria are one of the most pharmaceutically valuable groups of bacteria discovered by scientists. This study is done to fully characterize Actinobacteria isolates to examine their diversity and ability to putatively produce antibacterial compounds. Colonies were isolated from soil samples collected across Jamaica. The preparation of soil suspensions and execution of serial dilutions were the techniques used for plating the samples on selective media. Genomic DNA extraction, BOX/A1R PCR and 16S rRNA PCR were the molecular techniques used to genetically characterize the pigment-producing isolates. The antibacterial properties were assessed by screening against the test bacteria Escherichia coli, Pseudomonas aeruginosa, Listeria sp., Salmonella sp., Pantoea (Erwinia sp.), Klebsiella pneumoniae and Staphylococcus aureus. The most noteworthy isolates were then selected for DNA sequencing. Bacterial classifications and overall phylogeny were determined using the BLAST, DNASTAR and the MEGA-X software. Over three hundred putative Actinobacteria colonies were isolated from the soil samples used in this study. 90 pigment-producing isolates were selected and screened against the test bacteria and all 90 isolates showed inhibitory activity against one or more of those test microorganisms. Following genomic DNA extraction, BOX/A1R PCR indicated that ~95% of the isolates were distinct, concluded by the analysis of a dendrogram prepared using the CLIQS Image Gel Analysis Software. 16S rRNA PCR was used to amplify the isolates and 22/90 were partially sequenced by DNA sequencing. BLAST analysis revealed that the majority of the isolates fell under the Streptomyces genus, with other interesting genera and species. Using DNASTAR and MEGA-X, phylogenetic relationships were deemed significantly different, with a few similarities. The overall characterization of these isolates was well achieved. These isolates can be applied

to scenarios such as antimicrobial and insecticidal analysis, plant growth promotion and bioremediation. This reveals that the Actinobacteria are indeed a valuable group of bacteria for biotechnological research.
Keywords: Actinobacteria; Antibacterial; Soil.