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Identification and Characterization of Antibacterial Agents from Soil-Borne Bacteria in Mining Areas of Bellary District, Karnataka

This study investigates the bacterial species present in soils from mining areas in Bellary District, Karnataka, and explores their potential as antibacterial agents. Soil samples were collected and subjected to a series of analyses, including staining, biochemical testing, and screening for antibiotic production. The antibacterial activity of the isolates was evaluated against a range of clinical pathogens: *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Enterococcus faecalis*, *Acinetobacter spp.*, *Staphylococcus aureus*, and *Proteus mirabilis*. Isolates demonstrating potent antibacterial activity were further analyzed. Their broths underwent ethyl acetate extraction, and the resultant ethyl extract was re-evaluated for antibacterial efficacy. The most effective isolate, designated SR1, were characterized using 16S rRNA sequencing, which identified it as a *Bacillus spp.* Phylogenetic analysis corroborated this identification. The results underscore SR1's notable antibacterial activity against the tested clinical pathogens, suggesting its potential as a source of new antibacterial agents. Current efforts are focused on further characterization of the antibacterial compounds produced by *Bacillus spp.* to understand their mechanisms and potential applications.

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