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Antimicrobial biopolymer (PHV) production and its *in-silico* analysis

Jayasree A S
CMS College of Science and Commerce, India

Polyhydroxyalkanoates are biodegradable and thermoprocessable which makes them more attractive for applications in the medical field. The objectives of study were to isolate *Pseudomonas* sp. from soil, screen PHV producing *Pseudomonas* sp. by rapid screening method and phenotypic method, morphological, biochemical, physiological and molecular characterization of selected soil isolates, to produce PHV by using production medium, to check the antibiotic susceptibility of test pathogens, to make extracts of *Averrhoa bilimbi* leaves and testing its antimicrobial activity against test pathogens, to incorporate *Averrhoa bilimbi* leaves extract with PHV and testing its antimicrobial activity against the test pathogens, to identify the compounds in methanol extract of *Averrhoa bilimbi* leaves by GC-MS analysis and to perform *in-silico* analysis of PHV and compound of plant extract. In this present investigation, rapid screening tests were carried out for 10 isolates from the soil sample among which only one isolate showed positive result which was taken for further study and was confirmed by screening by Sudan Black B staining. Poly 3-hydroxyvalerate was produced from *Pseudomonas fluorescens*. It was extracted by using Chloroform-Sodium hypochlorite extraction method. The powder was dried and weighed (0.67 g/100 ml). The antibiotic susceptibility of test pathogens was carried out by Kirby Bauer method. The leaf extract of *Averrhoa bilimbi* plant has many medicinal values. Soxhlet apparatus was used for the extraction of *Averrhoa bilimbi* leaves. Antibacterial susceptibility testing was carried out by well diffusion method and it showed zone of inhibition against *Escherichia coli* and *Staphylococcus aureus*. When PHV was added to the plant extract it was shown to enhance the antimicrobial activity. The compounds present in the extract were identified by GC-MS analysis. The best ligand-pose energy between the protein and antimicrobial PHV was found by *in-silico* analysis. It was concluded from the results that the antimicrobial PHV inhibits the bacterial protein.

jayasreeas2211@gmail.com

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