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Biosynthesis, production optimization and antifungal property of indole-3-acetic acid from *Pseudomonas aeruginosa* ROO1S

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Abstract

Rhizobacteria colonize the roots of plants after being introduced to seedlings or the rhizosphere through inoculation, thereby stimulating growth. Indole-3-acetic acid (IAA), an essential phytohormone stimulates cell proliferation, growth, and enhance nutrient uptake from the soil. However, IAA has conventionally been produced by chemical synthesis, with practical limitations such as high cost of chemicals which are also not eco-friendly. Sustainability of IAA production from *Rhizobacteria* and their antifungal potential would be an alternative cost effective and natural approach to overall plant health. Isolation and screening for indole-3-acetic acid producing bacteria from plant rhizosphere was done using a chemically-defined medium and Salowisky reagent. Quantification of IAA produced by selected isolates, through submerged fermentation was estimated with a Spectrophotometer. Molecular identification of highest producer was done using standard methods while production parameters were optimized for improved IAA yield. Antifungal activity against selected pathogen was analysed with the dual culture method. Change in color to pink after addition of Salowisky reagents indicated the presence of indole-3-acetic acid. The concentrations of IAA produced from selected isolates ranged between 218.88 ± 0.00 and 393.88 ± 0.01 µg/mL. Highest IAA-producing bacteria was identified as *Pseudomonas aeruginosa* ROO1S (Accession PV123886). Optimal IAA production was obtained at 25°C (463.88 µg/mL), with 2g/L tryptophan substrate (505.13 µg/mL), tryptone (613.87 µg/mL) and mannitol (718.87 µg/mL) as nitrogen and carbon sources respectively, and 150 rpm agitation (356.38 µg/mL). Optimisation yielded 865.13 µg/mL of IAA. The extracted compound exhibited antifungal activity. Conclusively, *Pseudomonas aeruginosa* ROO1S is an IAA-producing bacteria. Optimisation increased IAA production and the compound exhibited inhibitory properties against fungal phytopathogen.

Key Words: *Rhizobacteria, phytohormones, Indole-3-acetic, Salowisky reagent, P. aeruginosa*