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Biocontrol Efficacy of Wild-Type *Pseudomonas putida* in Managing Soil-Borne Fungi and Enhancing Growth and Yield of Groundnut Variety PHULE UNAP (*Arachis hypogaea* L.)

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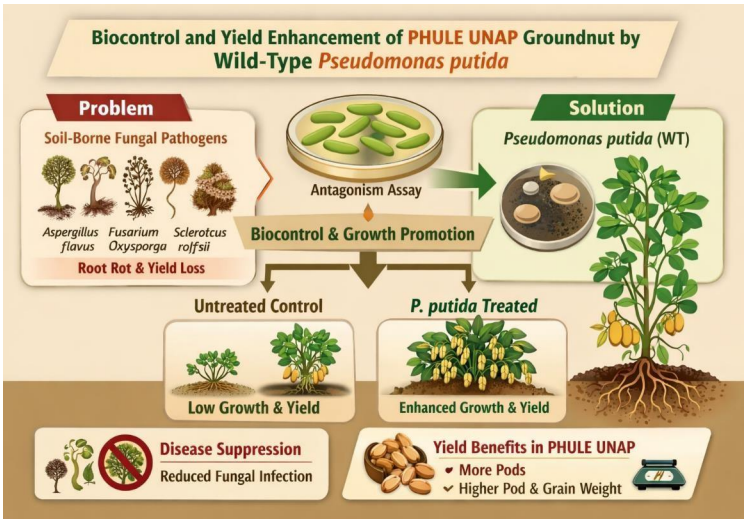

Graphical Abstract

Abstract: Soil-borne fungal pathogens severely constrain groundnut productivity by causing seedling mortality, crown rot, root and pod rots, and quality deterioration. This study evaluated a rhizosphere-derived wild-type *Pseudomonas putida* strain for its dual role as a biocontrol agent and plant growth promoter in groundnut, with emphasis on the variety PHULE UNAP (JL 286). The bacterium was isolated, characterized, and identified by 16S rRNA gene sequencing, and its antagonistic activity was assessed in vitro against ten dominant soil-borne fungi using dual culture assays. *P. putida* exhibited clear inhibition of all test pathogens and consistently outperformed *Bacillus subtilis* and *Brevundimonas sp.,* particularly against *Aspergillus flavus*, *Fusarium oxysporum*, *Aspergillus terreus*, and *Penicillium digitatum*. Pot culture experiments under controlled conditions showed that culture filtrate treatments significantly increased plant height and yield components across five groundnut varieties. PHULE UNAP responded most strongly, with marked improvements in early vegetative growth, final plant height, pod number, pod weight, and grain weight relative to untreated controls. Additional assays under targeted fungal inoculation indicated that *P. putida* moderated pathogen effects on PHULE UNAP growth. The results highlight wild-type *P. putida* as a promising component of integrated disease management strategies to enhance groundnut productivity in rainfed systems.

Keywords: *Pseudomonas putida*; biocontrol efficacy; soil-borne fungi; groundnut *(Arachis hypogaea L.)*; PHULE UNAP (JL 286); plant growth-promoting rhizobacteria

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