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Novel biofertilizers from nutmeg rhizosphere of Wayanad, Kerala

Salitha* & K Surendra Gopal

Department of Agricultural Microbiology, College of Agriculture, Kerala Agricultural University (KAU), Vellamkundu,
Thrissur - 680 656, Kerala, India

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Nutmeg, *Myristica fragrans* Houtt., an important spice crop from India, is mostly grown in parts of Kerala state. Here, we investigated the rhizosphere region of the nutrient exhaustive tree spice nutmeg for nitrogen fixers, phosphorus solubilizers and potassium solubilizers. In this study, we sought to find new biofertilizer strains from the nutmeg rhizosphere. Ten rhizosphere soil samples of nutmeg were collected from Wayanad district in Kerala. A total of 55 predominant isolates were obtained. The isolates produced indole acetic acid (IAA) in amounts between 0.4 and 11.81 $\mu\text{g mL}^{-1}$, fixed nitrogen in amounts between 2.1 and 3.5 mg g^{-1} of carbon source, solubilized phosphorus in amounts between 57.91 and 71.647 $\mu\text{g mL}^{-1}$, and solubilized potassium in amounts between 6.66 and 8.30 mg mL^{-1} . Based on the specific plant growth promoting traits and IAA production, 15 isolates were characterized and selected for abiotic stress tolerance (moisture and temperature) studies. With the molecular characterization of 16S rRNA, the six promising isolates were identified as *Staphylococcus equorum* (nitrogen fixer), *Staphylococcus pasteuri* and *Pseudomonas aeruginosa* (phosphate solubilizers), *Pseudomonas veronii* and *Sphingobacterium anhuiense* (potassium solubilizers). Possibly, it is the first report of novel biofertilizer strains from nutmeg growing areas of Wayanad district in Kerala.

Keywords: Abiotic stress tolerance, Indole acetic acid (IAA), *Myristica fragrans*, Plant growth-promoting rhizobacteria (PGPR), Spice