

## Evaluation of Native Rhizobia as Potential Candidates for Developing Biofertilizers for Improving Legume Cultivation in Dry Zone Sri Lanka

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### Abstract

Biofertilizers are currently receiving much attention due to the adverse effects associated with conventional synthetic fertilizers on human and environmental health. The major limitation of biofertilizers is their poor performance due to less adaptability to soil abiotic factors in the field. The objective of this study is to identify plant growth-promoting native rhizobia with tolerance to common soil stress conditions that can be developed as inoculants for legume cultivation in dry zone Sri Lanka. Root nodules were collected from non-edible legumes (*Alysicarpus vaginalis*, *Senna tora* (L.), *Leucaena leucocephala*, *Tephrosin purpurea*, *Mimosa pudica*, *Desmodium continuum*, and *Derris scandens*) in different sampling sites of Anuradhapura district (Thambuttegama, Thalawa, Anuradhapura Town, Mihinthale, Galnewa, Kekirawa, and Mahailuppallama). Sixteen strains were isolated on the Yeast Mannitol Agar medium with Congo Red. They were coded for convenience and screened for plant growth-promoting traits with three replicates. Nine isolates showed nitrogen fixation, inorganic phosphate solubilization, and indole-acetic acid synthesis capabilities. These strains were screened against the abiotic stress tolerance with three replicates. All strains survived at 3.0% salt condition. Three out of nine (TBII-1, TBAS-2, and KEPT-1) showed the highest saline tolerance (5.0% salt). TBII-1 and KEPT-1 strains thrived at 45 °C showing adaptability to high-temperature. At 0.1%, 0.2%, and 0.4% of PEG, KEPT-1 had the best survival. The majority of the isolates grew best at pH levels ranging from pH 5 to 8. Three rhizobial strains (TBII-1, TBAS-2, and KEPT-1) were identified as potential candidates for formulating biofertilizers for edible legume cultivation in the Anuradhapura district of Sri Lanka.

**Keywords:** *Non-edible legumes, Rhizobia, Biofertilizers*