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ISOLATION OF ABIOTIC STRESS TOLERANT RHIZOBIA INHABITING *Mucuna bracteata* FROM SELECTED LOCATIONS OF PUTTALAM DISTRICT, SRI LANKA

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The symbiotic relationship between legumes and *Rhizobium* significantly aids in the growth and development of crops by promoting biological nitrogen fixation in nitrogen-depleted soil. *Rhizobium* is a group of soil bacteria that form mutualistic relationships with leguminous plants like *Mucuna bracteata*, which exhibit high nitrogen fixation ability. However, only a few studies have focused on the identification of stress-tolerant rhizobial populations inhabiting *M. bracteata*. A total of 35 rhizobial strains that are resilience to environmental stresses were isolated from the root nodules of *M. bracteata* from seven locations (Madampe, Dankotuwa, Wijayakatupotha, Pallama, Puttalam, Kumarakattuwa, and Bangadeniya) in Puttalam District, Sri Lanka. The isolated rhizobial strains were subjected to different physiological conditions such as temperature (25 °C-45 °C), drought (polyethylene glycol 8000 concentrations, 0.1% - 0.4%), pH (3.0 - 9.0), and salinity (NaCl concentrations, 0.1% - 3.0%). Stress-tolerant rhizobial strains were selected based on statistical analysis of spectrophotometric absorbance measurements. Due to high salinity levels in seven sites, rhizobial strains showed a high growth at 1% salt concentration and less tolerance with increasing salt concentrations. The rhizobial strains showed optimal growth at 35 °C because the Puttalam district temperature varies from 20 °C to 36 °C. Except for *Pallama* and *Kumarakattuwa* sites, most of the rhizobial strains showed high absorbance under varied drought conditions. *Rhizobium* growth was hindered at pH 3.0 and 4.0 but it increased up to pH 7.0 because of the optimum growth of rhizobia at soil pH 6.0 - 7.0. Among these isolates, 16 isolates exhibited tolerance to more than two physiological conditions, with nine isolates identified as the best tolerant rhizobial strains. These most tolerant strains can be cross-inoculated with crop legumes to remedy the widespread use of chemical nitrogen fertilizers.

Keywords: Biological nitrogen fixation, *Rhizobium*, Stress tolerance