

Effects of *Rhizobium*-Based Biofertilizer on Nodulation Efficiency and Growth of Black Gram (*Vigna mungo* L.) and Soybean (*Glycine max* L.)

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Although inorganic fertilizers enhance crop production, excessive usage reduces soil fertility and causes pollution and health hazards. Biofertilizers could be a sustainable alternative to manage soils without yield reduction. *Rhizobium*-based biofertilizers have been introduced to Sri Lanka and have been successively applied in some areas where legumes are cultivated. This study was designed to examine the impact of the *Rhizobium*-based biofertilizers on nodulation and growth of black gram (*Vigna Mungo* L.) and soybean (*Glycine max* L.) in Kilinochchi. A pot experiment was conducted at the University of Jaffna, Ariviyal Nagar, Kilinochchi, which falls within the DL3 agroecological region (Flat to Slightly Undulating Low Country Dry Zone), with three treatments: T1 (No fertilizer), T2 (Recommended inorganic fertilizers), and T3 (*Rhizobium*-based biofertilizer) with five replicates. The measurements of plant height, biomass, nodulation and nutrient uptake were taken. The results indicated that *Rhizobium* inoculants significantly increased the growth and nutrient uptake in both crops. In black gram, T3 (*Rhizobium*-based biofertilizer) plants showed significant differences in plant height compared to T2 (Recommended inorganic fertilizers) at 15 days after planting (DAP), but no differences at 30 DAP. In contrast, significant differences were observed only at the later stage in soybean plants. Significantly higher numbers of total and active nodules were observed in T3 (*Rhizobium*-based biofertilizer) compared to T2 (Recommended inorganic fertilizers) in black gram, while no nodules were observed in soybean. In both plants, T3 (*Rhizobium*-based biofertilizer) recorded significantly higher plant biomass and nutrient uptake (NPK) than T2 (Recommended inorganic fertilizers). In conclusion, the *Rhizobium*-based biofertilizers are capable of replacing urea application to black gram and soybean in Kilinochchi soils and require detailed studies to validate their effects under field conditions.

Keywords: Biofertilizer, *Rhizobium* inoculants, Black gram, Nutrient uptake, Soybean