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Effect of Rhizobium inoculation and inorganic fertilizer levels on growth, yield and shelling percentage of two groundnut varieties

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Abstract:
Optimizing groundnut yield through effective use of biological and inorganic inputs is essential for sustainable production. This study evaluated the effect of Rhizobium inoculation and different levels of inorganic fertilizer on the growth, yield, and shelling percentage of groundnuts in the Killinochchi District from May to September 2024. A two-factor factorial experiment was conducted in a randomized complete block design with three blocks. Within each block, 12 treatment combinations were applied. The first factor included six fertilizer treatments with or without Rhizobium inoculation: (F_1 (0% Rhizobium + 100% Fertilizer), F_2 (Rhizobium + 0% Fertilizer), F_3 (Rhizobium + 100% Fertilizer), F_4 (Rhizobium + 75% Fertilizer), F_5 (Rhizobium + 50% Fertilizer), F_6 (Rhizobium + 25% Fertilizer). The second factor was the groundnut variety (V_1: ANKG2 (Lanka Jambo) and V_2: Tissa,). All agronomic practices followed the Department of Agriculture, Sri Lanka guidelines, except for the fertilizer levels. Data on growth parameters, number of active and inactive nodules, yield components, and shelling percentage were collected and analyzed using ANOVA in SAS 9.1, with mean separation by Duncan's Multiple Range Test. The interaction effect between the two factors was non-significant. However, both factors significantly ($p < 0.05$) affected plant growth, yield and shelling percentage. Total nodule number and active nodules were significantly higher in ANKG2. This variety also showed superior yield metrics, including 100-seed weight and shelling percentage. while Tissa variety recorded the highest pod count. Significantly the highest dry weight at harvest, yield and shelling percentage were observed in F_3 (Rhizobium + 100% Fertilizer), while F_2 (Rhizobium + 0% Fertilizer), recorded the lowest. No significant difference was found between F_4 (75% fertilizer + inoculation) and F_1 (conventional practice). It can be concluded that the combination of ANKG2 with rhizobium inoculation and 100 % recommended fertilizer is the most effective for maximizing yield in Kilinochchi District followed by F_4 (75% fertilizer + Rhizobium inoculation) as a more input-efficient alternative.

Keywords: *Rhizobium*; Fertilizer levels; Growth; Groundnut, Yield

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