

ABSTRACT

Muhammad Alif Rifqi Alamsyah. 24020220140062. **Application of Plant Growth-Promoting Rhizobacteria (PGPR) and Its Effect on the Growth and Yield of Peanut Plants (*Arachis hypogaea* L.)** (under the supervision of Anto Budiharjo and Agung Suprihadi).

Declining peanut (*Arachis hypogaea* L.) productivity in Indonesia presents a critical challenge for sustainable agriculture. Excessive use of chemical fertilizers has degraded soil health, urging the need for eco-friendly alternatives such as *Plant Growth-Promoting Rhizobacteria* (PGPR). This study investigates the effects of different *Rhizobium* sp. isolates on the vegetative growth and biomass of peanut plants. The experiment was conducted using a Completely Randomized Design (CRD) with eight treatments, including one negative control and seven bacterial isolates. PGPR inoculation was applied under sterile gnotobiotic conditions using modified Leonard jars and vermiculite as the growth medium. Key parameters evaluated were plant height, leaf number, fresh weight, and dry weight after 28 days of growth. Statistical analysis using ANOVA and DMRT ($p < 0.05$) revealed significant differences across treatments. The AH19 isolate (P2 treatment) showed the most pronounced effects, increasing plant height by 30 cm, leaf number to 26, fresh weight to 9.01 g, and dry weight to 3.15 g. These enhancements are attributed to the isolate's ability to produce phytohormones such as indole-3-acetic acid (IAA), enhance nitrogen fixation, and improve nutrient uptake. The findings affirm PGPR's potential as a sustainable biofertilizer for boosting legume productivity while reducing dependency on chemical inputs. Future work should explore long-term effects, inoculum concentration optimization, and integration with organic amendments to enhance field applicability.

Keywords: *PGPR, Rhizobium* sp., *peanut, plant growth, biofertilizer, gnotobiotic system.*