Optimizing Soybean Growth and Production (*Glycine max* L.) with Phosphorus Fertilizer and Phosphate-Solubilizing Bacteria (*Pseudomonas fluorescens*)

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ABSTRACT

Phosphorus is an important element for soybean development because the availability of P in the soil affects the growth and yield of soybeans with the function of pod formation to seed development. However, phosphorus in the soil is difficult for plants to absorb because it is bound by iron or aluminum, resulting in suboptimal soybean growth, the application of phosphate-solubilizing bacteria is one way to address this issue. This study aims to examine the growth response and yield production of soybeans through the application of phosphorus fertilizer combined with phosphate-solubilizing bacteria (Pseudomonas fluorescens). The research was conducted in Krajan, Slawu, Patrang, Jember, from August to November 2025. It used a Randomized Block Design factorial with two factors: phosphorus fertilizer (P1=100 kg/ha/30g/plot, P2=125 kg/ha/37g/plot, P3=150 kg/ha/45g/plot) and phosphate-solubilizing bacteria (B1=30 ml/L, B2=50 ml/L, B3=70 ml/L), totaling 9 treatments repeated 3 times for 27 plots. Phosphorus fertilizer showed a highly significant effect, with the highest dose (P3) yielding: plant height at 21 and 28 HST, dry biomass 40.42 g, fresh pod weight per sample 56.23 g, dry pod weight per sample 43.01 g, dry seed weight per sample 18.72 g, dry seed weight per plot 133.11 g, and 100-seed weight 18.72 g. the application of phosphate-solubilizing bacteria (peseudomonas fluorecens) only had a significant effect on the wet pod and dry pod weight parameters per sample with the highest dose of wet pods (B3) 51.77 g and dry pods (B3) 37.31 g. Their interaction was not significant.

Keywords **:** *Phosphate-solubilizing bacteria (Pseudomonas fluorescens), Soybean, Phosphorus fertilizer.*