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Synergistic effects of Bacillus salmalaya strain 139SI with fertilizer on nutrient uptake and fertilizer use efficiency of oil palm seedlings

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Abstract
Aims: Plant-microbe interaction in the rhizosphere significantly influences nutrient uptake efficiency. Thus, this research was aimed to investigate the potential of Bacillus salmalaya strain 139SI in increasing nutrient use efficiency through its synergistic effects with fertilizer application. Methodology and results: This research analyzed the effects of B. salmalaya strain 139SI inoculant, fertilizer and a combination of both on soil nutrients, vegetative growth, chlorophyll level, photosynthetic activities, nutrient uptake and nutrient use efficiency in oil palm seedlings for four months in a nursery setting. At the end of the research, the inoculation of B. salmalaya strain 139SI resulted in a significant increase in palm growth, chlorophyll level, photosynthetic activities, nutrient uptake and nutrient use efficiency compared to the untreated group. Soil nutrient analysis demonstrated that the inoculation of B. salmalaya strain 139SI led to a notable increase in available nitrogen within the rhizosphere soil. The findings of this research also indicated a noteworthy synergistic effect between the B. salmalaya strain 139SI inoculant and fertilizer. The most promising outcomes for plant growth performance and nutrient uptake were observed when the B. salmalaya strain 139SI inoculant was added to the fertilized palm. Conclusion, significance and impact of study: This research shows that B. salmalaya strain 139SI may work synergistically with fertilizer to enhance nutrient absorption and increase fertilizer usage efficiency. Integrating B. salmalaya into the nutrient management of oil palm seedlings can potentially reduce reliance on synthetic fertilizers, offering advantages to both farmers and the ecosystem.

Author Keywords
Indole 3-acetic acid; nitrogen fixation; nutrient use efficiency; phosphate solubilization; plant-microbe interaction

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