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Effect of biofilm biofertilizers on paddy soil biofilm formation and mycorrhization in *Oryza sativa* L.: A laboratory simulation study

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Rice (*Oryza sativa* L.) is the staple food for a larger proportion of the world's population. Excessive use of chemical fertilizers (CFs) in rice farming directly affects the composition of soil microbial populations, leading to decreased abundance and diversity of soil microbes ultimately resulting in degraded agroecosystems. Biofilm biofertilizers (BFBFs) have been developed as an environmentally friendly alternative for reducing excessive CF usage in rice farming. The BFBF promotes the formation of mycorrhizal networks, which play a crucial role in nutrient transport and plant health. This study compares two fertilizer practices: CF practice [simulated using Yoshida's nutrient medium at 100% DOA CF recommendation (425 kg NPK/ha)+micronutrients] and, BFBF practice [simulated using Yoshida's nutrient medium at 66% DOA CF recommendation (225 kg NPK/ha)+micronutrients+BFBF (2.5 L/ha)] with Control [only micronutrients]. The experimental setup was constructed using two transparent glass plates, measured 25 cm×0.4 cm×15 cm in size, with a gap of 0.4 cm between the two plates. Then, sieved sand (1-2 mm), was filled into the gap of the glass plate structure and each structure was planted with three rice plants. At 3'08 rice variety was used as the test crop. *Aspergillus niger* spores were added as the stimulant mycorrhizal inoculum, and BFBF was added with soil extract. After 60 days, mycorrhizal networks were visible under 10x40 magnification with BFBF practice, indicating an enhanced symbiotic relationship between the stimulant mycorrhizal fungus and rice roots. The mycorrhizal networks were not observed under 100% CF practice, suggesting that 100% CF may inhibit such beneficial interactions. Minimal mycorrhizal networks were observed in the control treatment. The study concludes that the BFBF practice enhances beneficial microbial interactions, particularly forming beneficial fungal networks in paddy soils.

Keywords: Biofilm biofertilizer; mycorrhizal networks; rice (*Oryza sativa* L.); symbiotic relationship

Underlined is the presenting author.