

FUNGAL – BACTERIAL BIOFILMED BIOFERTILIZERS (BFBF) FOR UPLAND CEREALS IN THE DRY ZONE OF SRI LANKA

H.M.A.R. Senavirathna Banda¹, G. Seneviratne² and D.M. Jinadasa¹

¹Dept. of Soil and Water Resources Management, Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura, Sri Lanka.

²Microbial Biotechnology Unit, Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka.

Present study was carried out to identify suitability of a previously developed Biofilmed biofertilizer for upland rice (BG 300), finger millet and common millet. In pot experiments, the crops were treated with, T₁ = BFBF + 50% of chemical fertilizers (CF) recommended by the DOA, and T₂ = DOA recommendation. Experimental design was Complete Randomized Design (CRD) with three replicates. Effects of the BFBF on germination of the three crops and plant growth were studied. Biofilm association on root hairs of the BFBF inoculated seeds was observed microscopically. BFBF was applied by soaking seeds in the biofertilizer for 24 hours and then by spraying at a rate of 25 l/ha on to sown seeds in pots. At panicle initiation and grain filling stages, a foliar spray consisting of leaf bacteria was applied. Two and half months after sowing, plants were harvested, and biological nitrogen fixation (nitrogenase activity through acetylene reduction assay), shoot and root dry weights as well as available soil NO₃⁻, NH₄⁺, PO₄⁻³ and total organic carbon were determined.

Root hairs of all BFBF inoculated crops were found to be colonized by biofilms with significant plant growth promoting effects. The germination percentages increased significantly by ca. 74% and 16% for finger millets and rice, respectively over the controls, whereas no significant improvement for common millets. Rice and finger millet showed positive responses to acetylene reduction assay. Shoot/root dry weight ratio was significantly higher in BFBF inoculated rice, and there were no significant increases in other two crops compared to DOA recommendation. Results showed that the BFBFs developed for rice are also beneficial for finger millet, which implies that the BFBFs are not always crop specific. However, different types of BFBF should be developed for common millet.

Key words: Biofilmed biofertilizer, Biological nitrogen fixation, Cereals