

FUNGAL-BACTERIAL BIOFILMS IMPROVE EARLY VEGETATIVE GROWTH OF STRAWBERRY (*FRAGARIA x ANANASSA*) OVER THEIR MONOCULTURES

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The use of mono and mixed-culture based biofertilizers for Strawberry has been reported earlier. However, the efficacy of fungal-bacterial biofilms (FBBs) as biofertilizers for Strawberry has not been tested yet. Therefore, this study focused to examine the action of FBBs as biofertilizers for Strawberry in comparison to their monocultures. Plant growth promoting cultures; two fungal strains (F1 and F2), two bacterial strains (B1 and B2) isolated from strawberry rhizosphere, one bacterial strain (B3) isolated from wild strawberry rhizosphere, and their biofilms were used. Five simple FBBs (BF1-BF5) and four higher order FBBs (HO1–HO4) were included. Nitrogenase activity (acetylene reduction assay) and pH of all microbial cultures and FBBs were determined. Developed FBBs, and bacterial and fungal monocultures were inoculated into soil in potted strawberry (*var.* Chandler) as treatments. Chemical fertilizer (CF) was used in the reference treatment. A control was maintained without microbes or CF. Six replicates per treatment were arranged according to completely randomized design in a glasshouse. Plants were maintained for six weeks and growth parameters were measured. Data were analyzed using ANOVA. Statistical analysis was performed by Minitab (version 16). The pHs of all monocultures were in the range of 5 and 7 whereas all the biofilms were in the basic range. Nitrogenase activity was shown by BF2, BF3 and HO1 only. HO2-HO4 showed significantly higher ($p < 0.05$) leaf area while B3, HO1, HO2, BF2 and BF5 showed comparatively higher (at $p < 0.1$) leaf numbers than that of other treatments. Other growth parameters such as biomass, shoot length and number of runners were not significantly different. BF4 produced more runners than the rest, though the difference was not significant. Treatment ranks (taking into consideration all the growth parameters) were in the order of BF4 > F1 > BF1 > BF5 > B3 > HO3 > HO4 > HO1 > B2 > HO2 > CF > F2 > Control > BF2 > B1. The findings suggest that the efficacy of some FBBs were superior in terms of nitrogenase activity and some growth parameters such as leaf area. Since these preliminary results indicate an increase in most growth parameters investigated with the use of FBB's, further testing under field conditions are suggested.