

RICE ROOT INTERACTIONS WITH A DEVELOPED CYANOBACTERIAL BIOFILM AND ITS MONOCULTURES

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The application of chemical fertilizers increases the rice growth and harvest. However, excessive application adversely affects the soil quality and also contaminates water sources. Hence, the application of biofertilizers such as biofilmed biofertilizers to rice is an economically viable and environmental friendly option. Since rice field is a favorable environment for cyanobacterial growth, we hypothesize that they may play an important role in enhancing plant growth, development and soil fertility. It is generally reported that biofilm mode of microbes are more effective than monocultures in microbial action. Hence, the objective of this study was to compare the efficiency between the tripartite cyanobacterial biofilm and its monocultures. Cyanobacterial tripartite biofilm was obtained from the culture collection of the Institute of Fundamental Studies. A greenhouse pot experiment was conducted for 60 days using different treatments; *Calothrix*, *Cylindrospermum*, *Nostoc*, their cyanobacterial tripartite biofilm and no amendment control in sterilized sand medium fed with Yoshida nutrient solution. Soil solutions were extracted and subjected to *FTIR analysis*. *Spectra were analyzed using OMNIC version 7.3 and MINITAB version 16. As plant growth parameters*, number of leaves, length and width of leaves, stem girth, root and shoot length, dry weight of roots and shoots *were measured in rice plants after 2 months*. All data were analyzed by *MINITAB version 16*. The cyanobacterial biofilm treated plants showed the highest number of leaves and widest leaves at the harvest. *FTIR spectra showed higher biochemical diversity in cyanobacterial biofilm inoculated soil solution than other treatments, which implied the microbial effectiveness of cyanobacterial biofilm*. Moreover, the cyanobacterial biofilm and its monocultures were clustered separately. Cyanobacterial biofilm spectrum showed a peak at 1634 cm^{-1} , indicating presence of an aldehyde compound, which was not observed in other treatments. Further studies should be conducted to investigate the performance of these inoculants under field conditions.