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## Biofilm application is more effective than microbial inoculation to soil in agricultural biofertilization

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Abstract: More than a century ago, scientists identified that inoculation of effective microbes, rhizobia in particular improved plant growth and yield. Based on the subsequent research, they developed biofertilizers for legumes and then for non-legumes. The theory behind this practice is that the inoculated microbes colonize the root system and provide nutrients and plant growth promoting substances via a range of mechanisms like biological nitrogen fixation, nutrient solubilization etc. However in the recent past, it has been proven that developed, beneficial microbial communities in biofilm mode can exert a better effect than the microbial inoculation on plant growth and yield, and also soil condition. Therefore, biofilms have now been formulated as biofertilizers which are known as Biofilm biofertilizers (BFBFs). Once applied to the soil with crop plants, the BFBFs release a wider range of biologically important biochemicals which are generally depleted under conventional agricultural practices. The most important process that takes place with the biochemicals is the breaking of dormancy of microbial seed bank that is developed to bypass the stresses of the agricultural practices like tillage, chemical inputs etc. This increases biodiversity and abundance of soil microbes and their communities. This is well-supported by root exudates of the growing crop plants, leading to a symbiotic interaction which is beneficial to both the microbes and the plant. Also that improves soil organic matter, and hence soil health, which has implications in crop production and the environment. In this manner, the BFBFs application increases functioning and sustainability of agroecosystems. The BFBFs are now being researched in several countries with promising results. In Sri Lanka, they are being used in thousands of hectares of paddy cultivation by cutting down farmers' chemical fertilizer use up to 50%, while increasing crop yields by ca. 20% on average.

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