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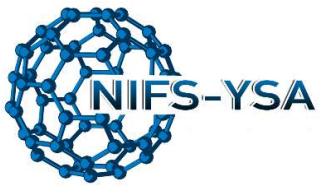

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Biofilm biofertilizer leads to mitigate climate change

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Background: Removing carbon (C) from the atmosphere and storing it in the soil is called soil carbon sequestration (SCS). In the phase of degradation of natural ecosystems like forests, agroecosystems might play a crucial role in SCS. In agroecosystems, Biofilm biofertilizers (BFBF) have been reported to reinstate the lost soil biodiversity and soil C accumulation that lead to increase the grain yield and SCS. However, the effect of BFBF on the organo-mineral complexation (OMC) which greatly affects the stabilization of sequestered soil C has not been studied.

Objectives: Therefore, the present study was carried out to evaluate the effect of BFBF on the OMC of paddy soils.

Methods: Twenty-six representative paddy fields spread over thousands of hectares in four districts were selected to apply the two treatments i.e. farmers' chemical fertilizers (CF, i.e. urea, TSP & MOP) practice (425 kg CF ha^{-1}), and BFBF practice (2.5 L of BFBF with 225 kg CF ha^{-1}). Soil pH, moisture (SM), organic C (SOC), labile C (SLC), respiration (SR, MicroResp^{TM} assay), cultivable bacterial abundance (SBA), and fungal abundance (SFA) were analyzed, and ATR-FTIR spectroscopic study was performed to qualitatively assess the OMC.

Results: A significantly ($P < 0.05$) higher SBA and SFA, followed by a lower SR were observed in the BFBF practice due to low priming triggered by microbial immobilization of fresh C. In addition, transmittance readings of FTIR spectra showed increased aromatic C in soils treated with BFBF compared to farmers' CF practice. The spectra also showed enhanced aggregation and consolidation of mineral-associated organic matter due to BFBF application.

Conclusion: As such, application of BFBF promoted OMC and reduced SR, possibly due to enriched microbial abundance which could finally contribute to mitigate climate change.

Keywords: *BFBF, Climate change, Organo-mineral complexation, Paddy cultivation, Soil carbon sequestration*