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Research Article

Dynamics of soil biological fertility as influenced by organic and inorganic inputs under soybean in vertisol

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Summary

The integrated use of crop residues, biofertilizer and inorganic fertilizers in vertisol improved fertilizer use efficiency and nutrient turnover through augmentation of biological activity specially enzyme activity which is a step toward sustainable agricultural production. Highest soil microbial biomass C (340.25 µg Cg^{-1} soil) and biomass N (30.15 µg N g^{-1} soil) were recorded in Bradyrhizobium + 100% RDF *i.e.* 30 kg N + 75 kg P_2O_5 ha^{-1} treatment followed by incorporation of wheat straw @ 4 t ha^{-1} + 100% RDF. Incorporation of wheat straw and sugarcane trash along with chemical fertilizer significantly increased SMBC and SMBN content over their alone application. There was significant influence of crop residues and biofertilizer on soil enzyme activity *i.e.* dehydrogenase activity over control. Incorporation of wheat straw @ 4 t ha^{-1} + 100% RDF significantly increased soil dehydrogenase activity as compared to all other treatments. Bacterial and actinomycetes population were found maximum *i.e.* 29.6 CFU $g^{-1}x\ 10^7$ and 25.0 CFU $g^{-1}x\ 10^6$, respectively in seed treatment with Bradyrhizobium + 100% RDF, whereas, fungal population was found to increase (21.4 6 CFU $g^{-1}x\ 10^4$) with the incorporation of wheat straw @ 4 t ha^{-1} + 100% RDF followed by sugarcane trash with 100% RDF. Seed inoculation with Bradyrhizobium with 100% RDF recorded highest grain yield (24.59 ha^{-1}) and was followed by wheat straw + 100% RDF. SMBC, SMBN, dehydrogenase activity and soil biota were significantly correlated with soybean yield.

Key words : Soil microbial biomass carbon and nitrogen, Soil microbial population, Dehydrogenase activity, Integrated nutrient management,Vertisol

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