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Impact of Organic Farming on Soil Fertility and Microbial Activity

Authors : Menuka Maharjan

Abstract : In the name of food security, agriculture intensification through conventional farming is being implemented in Nepal. Government focus on increasing agriculture production completely ignores soil as well human health. This leads to create serious soil degradation, i.e., reduction of soil fertility and microbial activity and health hazard in the country. On this note, organic farming is sustainable agriculture approach which can address challenge of sustaining food security while protecting the environment. This creates a win-win situation both for people and the environment. However, people have limited knowledge on significance of organic farming for environment conservation and food security especially developing countries like Nepal. Thus, the objective of the study was to assess the impacts of organic farming on soil fertility and microbial activity compared to conventional farming and forest in Chitwan, Nepal. Total soil organic carbon (C) was highest in organic farming (24 mg C g^{-1} soil) followed by conventional farming (15 mg C g^{-1} soil) and forest (9 mg C g^{-1} soil) in the topsoil layer (0-10 cm depth). A similar trend was found for total nitrogen (N) content in all three land uses with organic farming soil possessing the highest total N content in both 0-10 cm and 10-20 cm depth. Microbial biomass C and N were also highest under organic farming, especially in the topsoil layer (350 and 46 mg g^{-1} soil, respectively). Similarly, microbial biomass phosphorus (P) was higher (3.6 and 1.0 mg P kg^{-1} at 0-10 and 10-20 cm depth, respectively) in organic farming compared to conventional farming and forest at both depths. However, conventional farming and forest soils had similar microbial biomass (C, N, and P) content. After conversion of forest, the P stock significantly increased by 373% and 170% in soil under organic farming at 0-10 and 10-20 cm depth, respectively. In conventional farming, the P stock increased by 64% and 36% at 0-10 cm and 10-20 cm depth, respectively, compared to forest. Overall, organic farming practices, i.e., crop rotation, residue input and farmyard manure application, significantly alters soil fertility and microbial activity. Organic farming system is emerging as a sustainable land use system which can address the issues of food security and environment conservation by increasing sustainable agriculture production and carbon sequestration, respectively, supporting to achieve goals of sustainable development.

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