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Short Communication

Biotic and Abiotic Process in Soil Organic Matter and Nutrient Regeneration

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DESCRIPTION

The Soil Organic Matter (SOM) is a complex for the combination of living organisms, fresh organic residues, actively decomposing material, and stabilized organic matter (otherwise known as humus). Generally, the samples containing 50% or more of carbon are referred as Soil Organic Carbon (SOC). The Soil Organic Matter (SOM) is mainly composed of carbon, hydrogen and oxygen but also has small amounts of nutrients such as nitrogen, phosphorous, sulphur, potassium, calcium and magnesium contained within the organic residues. The soil organic matter also exists as four distinct fractions which vary widely in their in size, composition and turn-over times in the soil.

The Organic matter mainly contains carbon and hydrogen as well as a number of other elements such as oxygen, nitrogen, phosphorus etc., and can originate from plants or animals. The major input into the soil is from plants, in the form of above ground or below ground material which involves both abiotic and biotic processes of decomposition [1]. Abiotic processes include mechanic forces acting on the litter, bacterial and fungal decomposers are responsible for the biotic part of Organic Matter (OM) decomposition. To break down macromolecules into pieces small enough for ingestion, decomposers produce exo-enzymes that diffuse through the water films to the substrate.

A Soil Organic Carbon (SOC) is simultaneously a source and sinks for nutrients and plays a vital role in soil fertility maintenance [2]. Several Microorganisms are present in the soil ecosystem and have various properties to decompose the organic carbon fraction like Cellulose, lignin, hemicelluloses, chitin and lipids present in soil organic matter. Organic matter decomposition is primarily a microbiological process and its actual rate and extend are influenced by environmental variables, including soil temperature, moisture, oxygen, nitrogen content, the quality and quantity of carbon substrates are well known for the soil management.

The soils are major site for plant nutrient regeneration through the process of decomposition. These decomposition processes also generates long-term soil organic matter and plays an important role in the global carbon cycle [3]. The decomposition of organic matter in soils is accomplished largely by the microorganisms, often in association with animals. The rate and course of decomposition is influenced by the climate, organic matter composition and nutrient availability from the environment.

Earthworms, micro-arthropods can play key roles in influencing the activities of microorganisms in organic matter processing in soil. It is well established that there are larger populations of fungi, bacteria and actinomycetes, and higher enzymatic activity in earthworm casts than in bulk soil [4]. Higher proportions of cellulolytic, hemicellulolytic, nitrifying and denitrifying bacteria and larger, more diverse fungal populations have been recovered from casts than surrounding soil. Soils in a terrestrial ecosystem are major carbon sinks. The pool of organic carbon is of particular interest because even small changes in the flux rates into or out of the pools of soil organic matter could have a strong influence on the atmospheric carbon dioxide concentrations and associated with the climate changes [5].

CONCLUSION

The soil organic matter can be protected from decomposition in a number of ways. It can be physically protected in the interior of soil aggregates, exoenzymes and decomposers and where the oxygen levels may be lower. The organic matter can also be chemically protected by adsorption into mineral surfaces. In addition, the presence of chemical structure for the organic molecules themselves makes them more or less easy to decompose. For example, the cellulose is a regular structure which is very easy to split into its subunits, whereas irregular humic substances offer less accessible attack points for enzymes. In deep soils, where the decomposers may be scarce, lower temperature, C: N ratio and larger scale spatial separation can also slow down decomposition. Here, we quantify the capacity of various factors for the decomposition that is being altered simultaneously as a result of global environmental change. Therefore, it is more important to study the sensitivity of soil

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organic matter decomposition with respect to multiple and interacting drivers.

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