

Effects of litter source on the dynamics of particulate organic matter fractions and rates of macroaggregate turnover in different soil horizons

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Abstract

Soil texture influences the transformation of soil organic matter (SOM), and depletion and reduction in the number of macroaggregates. However, the extent of changes in SOM in response to its quality and mechanisms of stabilization in different types of soil texture is unclear. We evaluated changes in SOM during a 30-week incubation experiment using seven soils mixed with two sources of litter; *Vachellia karroo* (Hayne) Banfi & Galasso leaf and *Zea mays* L. stover. We hypothesized that changes in intraparticulate organic matter (iPOM) are influenced by litter quality • soil type • time interactions, which affect rates of turnover of macroaggregates. A completely randomized design was used in arranging soil jars in the incubator. Free light fractions and coarse and fine iPOM within macroaggregates ($>250\text{ }\mu\text{m}$) decreased exponentially from week 1 to 30 and were significantly ($P < 0.05$) affected by litter source • soil horizon • time interactions. Trends of changes in fine iPOM fractions were the same in macroaggregates and microaggregates ($P < 0.05$). The greatest changes in POM fractions occurred 8 weeks after litter incorporation. Both *V. karroo* leaf and *Z. mays* stover stabilized macroaggregates during the first 8 weeks after incubation; thereafter they lost their influence. Therefore, we needed to reapply fresh litter after this period. Changes in iPOM fractions and macroaggregate turnover were specific to a soil type, suggesting that different sources of litter have different stabilizing effects in macroaggregates. Soil macroaggregate stabilization and changes in iPOM could be used as indicators to apply more appropriate management practices for soil protection or productivity.