

Effects of litter quality on macroaggregates reformation and soil stability in different soil horizons

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Abstract The resilience of soils under varying litter quality is unclear. Therefore, this study investigated the effects of different litter sources on soils with low ($< 2\%$) initial organic carbon content on soil reaggregation and stability. Seven soils were incubated for 30 weeks at $25\text{ }^{\circ}\text{C}$ after adding high-quality *Vachellia karroo* leaf litter ($C/N = 23.8$) and low-quality *Zea mays* stover ($C/N = 37.4$). Soil aggregation (SA) and stability were evaluated by measuring mean weight diameter (MWD), whole soil stability index (WSSI), percentage water-stable aggregates (% WSA) and distribution fractions of dry-sieved soil aggregates size (P_{ai}). Cumulative macroaggregates yields, MWD, % WSA and WSSI in litter-amended soils increased up to week 8 during incubation and thereafter declined gradually in all soils. Litter quality significantly ($P < 0.05$) enhanced macroaggregation and soil stability across soils but had insignificant ($P > 0.05$) effects within a soil type. An increase in macroaggregation increased MWD, WSSI values and large and small aggregates distribution. Aggregation was significantly higher in soils with higher clay content than sand content, suggesting that soil texture was highly influential to the litter effects on SA. We concluded that the rate of soil aggregate reformation was influenced by soil type $\times$ time interactions which determined the extent and dynamics of macroaggregation during the 30 weeks of incubation.

Keywords Aggregation · Decomposition · Dynamics · Soil texture · Stability indices

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