



The role of soil fauna on soil organic matter storage depends on organic matter interaction with mineral matrix but not only on that.

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Globally across all biomes, soil fauna consumes more than half of annual litter fall and this proportion is even higher in temperate zone. Majority of consumed litter turn into fauna feces, which can either accumulate on soil surface or become incorporated in soil by bioturbation. Here field mesocosms (size?) that were either accessible or inaccessible to soil fauna were used to quantify the effect of soil fauna on C storage in mineral soil. In total how many? mesocosms were exposed in 23 locations covering all climatic zones around the world (mostly northern hemisphere). Results show that fauna increased incorporation and storage of C in mineral soil by fauna bioturbation. In comparison with previous metanalysis of litter consumption by soil fauna it can be estimated that about half of litter consumed by fauna is incorporated in soil and remained in mineral soil. Fauna mediated increase in organic matter incorporation in mineral soil layer increased with increasing actual evapotranspiration of the sites and decreasing C/N ratio of litter. Laboratory experiments show that most of the litter C incorporated in soil appear in form of particulate organic matter (POM) or POM occluded by mineral particles. Occlusion slows down its decomposition and may promote formation of microbial necromass.

Moreover, our experiments and extensive metanalysis show that, in comparison to litter, decomposition slows down even in fauna feces that accumulate on soil surface without direct contact with soil. Several mechanisms responsible for this decomposition slowdown in these holoorganic fauna feces was proposed and experimentally tested. Compare to litter in fauna feces easily decomposable substances has been removed, which not only reduce their decomposition but also priming effect litter addition may have. Priming effect is further reduced by fact that leachate from fauna feces has low CN ratio and causes negative priming effect compare to leachate from litter that cause positive effect. Nitrogen in holoorganic fauna feces gets less accessible due to binding of proteins and amino acids in insoluble complexes with phenolics. Fauna promote microbial growth, but also kill and digest microbes in its gut. The alternating promotion of microbial growth and killing and digestion of microbes may support accumulation of microbial biomass.