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Composition of organic matter in earthworm casts depending on litter quality

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Earthworms contribute to decomposition and stabilization of organic matter (OM) in soil. The digestion during intestinal passage inside worms may lead to a change in the composition of OM. It is largely unknown if and how the type of litter the earthworm is feeding on is affecting the OM composition in the casts. Fourier Transform infrared spectroscopy (FTIR) is used to determine the hydrophobic CH- (A) and the hydrophilic CO- (B) functional groups in OM. The objective was to compare the A/B- ratios of litter samples with that of (i) the corresponding casts of the primary decomposer Lumbricus terrestris and (ii) the water contact angles of ground cast samples and at intact cast surfaces. Litter from 10 different plant species including leaves of birch, beech, oak, spruce, pear, mustard and wheat straw (3 replicates) was offered separately to L. terrestris in microcosms containing a Luvisol soil. The OM composition of litter and that of casts, collected from the soil surface after 4-weeks was analyzed with FTIR (DRIFT technique). The A/B ratio of casts was generally increased as compared to that of the soil. For most litter types, the A/B ratio of cast was relatively similar except for casts from birch (Betula pendula) and pear (Pyrus communis) where the OM show a 3-times higher A/B ratio as compared to wheat (Triticum aestivum) or beech (Fagus sylvatica) casts. The higher A/B ratios seem to be related to the relative higher C/N ratios in the casts from Betula pendula and Pyrus communis feeding experiments. The results indicate that digestion of litter by the worm may change OM composition. The assumption that earthworm casts may enrich hydrophobic OM components could be verified only partly. However particulate and soluble OM fractions in the earthworm casts could have contributed to such differentiation.