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Effect of plant communities on aggregate composition and organic matter stabilisation in young soils

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Abstract

© 2014, Springer International Publishing Switzerland. Results: Deciduous forest soil accumulated the highest C content in the 0–5 cm layer (43 g C kg−1), whereas values in coniferous forest and arable soils were lower (30 and 12 g C kg−1, respectively). The highest portion of C in arable soil was accumulated in the mineral fraction (80 %), whereas 50–60 % of the C in forest soils were in POM. More C was associated with minerals in deciduous forest soil (16 g C kg−1 soil) than under coniferous forest and arable land (8–10 g C kg−1 soil). Conclusions: Particulate organic matter explains most of the differences in organic C accumulation in soils developed during 45 years under the three vegetation types on identical parent material. The C content of the mineral soil fraction was controlled by plant cover and contributed the most to differences in C accumulation in soils developed under similar vegetation type (forest). Objectives: Carbon (C) content in pools of very young soils that developed during 45 years from loess was analysed in relation to vegetation: deciduous and coniferous forests and cropland. We hypothesised that variations in the amount of particulate organic matter (POM) can explain the C accumulation and also affects the C bound to mineral surfaces in soil under various vegetation. Methods: Soil samples were collected under three vegetation types of a 45-year-old experiment focused on initial soil development. Aggregate and density fractionations were combined to analyse C accumulation in large and small macro- and microaggregates as well as in free and occluded POM and mineral factions.

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Keywords

Aggregate turnover, Carbon accumulation rates, Carbon sequestration, Initial soil formation, Organic matter stabilisation, Young soils