Root derived particulate organic matter contributes considerable amounts of organic carbon to the soil carbon pool.

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The storage of soil organic matter (SOM) in forest soils is thought to be mainly driven by rhizodeposition. Root-derived particulate organic matter (POM) is commonly excluded from the analyses of rhizodeposits. Additionally, the organic carbon (OC) contents and the chemical composition of root-derived POM and other functional soil fractions in rhizosphere soil have not been directly elucidated and quantified.

In our study we investigated SOM fractions of rhizosphere soil regarding their carbon contents and chemical composition and compared the results with SOM fractions of non-rhizosphere soil.

The soil samples, taken in a Podzolic Cambisol under European beech, were subjected to a combined density and particle size fractionation. Besides carbon and nitrogen contents, we determined the chemical composition of bulk soil and soil fractions using solid state nuclear magnetic resonance spectrometry.

Bulk rhizosphere soil had twice as high OC contents, higher OC contents in the clay fractions and a six times higher abundance of POM compared to non-rhizosphere soil. Notably, rhizosphere POM was drastically less processed than the POM from non-rhizosphere soil. This altogether points towards a high and frequent supply of the rhizosphere-soil with POM.

Until now, root exudates have been considered to be the largest and most important contributor of OC inputs to soils from roots. Our results suggest that root derived POM also contributes considerable amounts of OC to the soil C pool.