



Soil organic carbon fractionation for improving agricultural soil quality diagnosis in Southern Belgium (Wallonia).

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We propose a simple method for separating bulk Soil Organic Carbon (SOC) into meaningful fractions to better diagnose soil quality, related to soil ecosystem functions and C sequestration potential. Soils under croplands and grasslands, and under both conventional and conservation management practices, have been analyzed all over the Southern part of Belgium (Wallonia). By separating carbon associated with clay and fine silt particles (stable carbon with slow turnover rate, $<20 \mu\text{m}$) and carbon non-associated with this fraction (labile and intermediate carbon with higher turnover rates, $> 20 \mu\text{m}$), effects of long-term and medium/short-term managements can be detected more efficiently at different scales. Values of stable carbon fraction for soil under grasslands are analyzed and used to create a theoretical stable carbon saturation curve for assessing carbon sequestration potential of Walloon soils. This theoretical curve is compared to Hassink's (1997) equation. Thus a saturation deficit of cropland soils can be determined and the effect of management practices can be assessed. Besides, spectroscopic analyses are performed on the bulk soil samples to test the potential for accurately estimating total SOC and stable SOC fraction in soil routine analysis performed by Walloon Public Services for local farmers.