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Estimating the potential of organic carbon sequestration in agricultural soils of Southern Belgium (Wallonia)

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A simple method for separating bulk Soil Organic Carbon (SOC) into two meaningful fractions (intermediary and stable) has been developed to better diagnose soil quality. The fractions are related to soil ecosystem functions and C sequestration potential. Soils under croplands and grasslands (either under conventional or conservation management practices) have been studied all over the Southern part of Belgium (Wallonia). By separating organic carbon associated with clay and fine silt particles (stable carbon with slow turnover rate, <20 μm) and carbon non-associated with those mineral particles (labile and intermediate carbon with higher turnover rates, > 20 μm), effects of long-term and medium/short-term managements can be detected more efficiently. 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 different others equations, e.g. Hassink's (1997) equation. Thus a maximum C saturation deficit 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. To finish, digital Soil Mapping techniques are developed to spatialize and estimate C saturation deficit at the regional scale.