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Organic matter quality in arable land as influence by clay content and cropping system

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Abstract:

Fifty fields from the Swiss plateau, cropped with Conservation Agriculture (CA) or conventional tillage (CT) since at least 10 years, were sampled for structure quality and soil analyses down to 40 cm depth. The organic matter (OM) quality was studied with Rock-Eval analysis. The relationships between cropping practices, depth, clay content, Soil Organic Carbon (SOC) content and OM quality were then discussed. CA and CT differed mostly by the location of SOC, with higher content on the topsoil in CA, and lower below 20 cm depth, compared to CT. OM quality was influenced by SOC content, showing increasing labile forms proportion with increasing SOC content. SOC to clay ratio, however, seemed to be the major determinant of OM quality, with the 0.1 ratio corresponding to a threshold above which changes in SOC content are mostly accounted for by labile forms, and conversely. This 0.1 SOC:clay ratio was already highlighted as a threshold for structural and physical behavour of the soil, thus leading to the hypothesis that the degradation of mid-recalcitrant forms under this ratio are responsible for structure degradation. Moreover, these results call for caution when interpreting field experiments with respect to OM quality, which appears to be driven by SOC:Clay ratio rather than cropping practices in this study.