



Lignin signature in response to land abandonment and erosion of dry luvisols in SE Spain

Sarah De Baets (1), Kristof Van Oost (1), Karen Baumann (2), Veerle Vanacker (1), and Cornelia Rumpel (2)

(1) Earth and Life Institute (ELI), Georges Lemaître Centre for Earth and Climate Research (TECLIM), Université catholique de Louvain, Place Louis Pasteur 3, B-1348 Louvain-la-Neuve, Belgium), (2) UMR Bioemco (Biogéochimie et Ecologie des Milieux continentaux), INRA, CNRS, UPMC, Bldg Eger, F-78850 Thiverval-Grignon, France

The aim of this study was to assess dryland degradation through changes in SOM composition in order to evaluate the long-term integrated effects of vegetation change on the ecosystem. To get insight into the stability and origin of SOC along a land use and topographical gradient, differences in lignin contribution to SOM were determined. Three deposition locations, three positions on the hillslope and three zones on top of the hillslope were selected on croplands and fields that were abandoned since 10 and 50 years, respectively. For each location topsoil (0-10 cm) and subsoil (10-20 and 20-30 if soil depth > 20 cm), as well as root and litter samples were analyzed for lignin content by CuO oxidation. Lignin-derived oxidation products were quantified as trimethylsilyl derivatives by gas chromatography (GC) with a HP gas chromatograph (HP GC 6890).

The results show that more lignin is found in soil from abandoned fields. For fields that were abandoned since 50 years, the sum of CuO oxidation products indicating total lignin content was highest for the deposition location and decreases along the hillslope. Lowest values were recorded for the most eroded zones on top of the hillslope. For cropland, there are hardly any differences in lignin content according to topographical position. For fields that were abandoned since 10 years, the deposition position was highest in lignin, whereas the slope position is characterized by the lowest lignin content. Observed differences in soil lignin quantity are most remarkable for the topsoil (0-10 cm). For deeper soil, differences are less pronounced, but follow the same trend as reported for the topsoil. However, no differences were evident when we look at lignin contribution to SOC (total mg lignin phenols/g SOC). This indicates that land use and erosion do not seem to influence SOC quality in the studied soil profiles.