The effect of agricultural practices on stabilization of organic matter in various soil types.

Pavlů Lenka, Borůvka Luboš, Zádorová Tereza, Penížek Vít, Balík Jiří
Czech University of Life Sciences Prague, Faculty of Agrobiology, Food and Natural Resources
Kamýcká 129, CZ16500 Prague Suchdol, Czech Republic
pavlu@af.czu.cz; boruvka@af.czu.cz; zadorova@af.czu.cz; penizek@af.czu.cz; balik@af.czu.cz

This contribution presents the preliminary results of the DivLand project – Centre for Landscape and Biodiversity. One of its branches deals with long-term changes in agricultural land cover and the effects of agricultural practices on soil properties. Over the last 70 years, the Czech landscape has undergone extreme changes, from the politically motivated massive consolidation of agricultural land and a change in the ownership structure through the intensification of agriculture to the limitation of livestock production and thus the use of organic fertilizers. All these changes can affect soil properties however, preliminary results show not unidirectional changes e.g., in soil pH and carbon content in arable land over this period in regions involving Cambisols, Luvisols and Chernozems. Therefore, it cannot be generalized that soil conditions have improved or worsened. Only the conversion of arable land to permanent grassland in the Cambisol areas resulted in an increase in carbon content.
A detail study (10 study sites; 20-year on-farm trial) focuses on the effect of manure application and crop residues incorporation (as measures often mentioned in connection with the carbon storage in the agricultural soils) on qualitative parameters of soil organic matter (SOM). The quality of SOM was assessed using diffuse reflectance infrared spectroscopy. The results show that the addition of certain forms of organic matter, such as manure, can increase the total organic matter content, but does not significantly determine the chemical composition of long-time retained organic matter. Rather, soil conditions determine which components are fixed in the soil on a long-term scale. A dominant effect of soil type was found in the distribution of all measured spectral parameters (potential wettability index, organic matter quality index, and decomposability index). The main differences between the soil types concern the aromatic and oxygen groups contained in the SOM. At the same carbon content, organic matter of Chernozems maintains high proportion of aromatics even with different treatment, and in contrast, proportion of aliphatic components remains high in all treatments on acid Cambisols. The stabilization of SOM in soils can thus be based on their specific affinity for minerals (clays, oxides) and on the formation of stable aggregates protected by the hydrophobic character of SOM components.

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