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Different organic carbon status in soil and its influence on the distribution of 14C-labelled xenobiotics in soil fractions

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Aggregate size fractionation in combination with chemical extraction was used to assess pesticide interactions with soil organic matter under different soil management practices [1].
In this study, surface area measurements (BET-N2) were established as a method to calculate the distribution of organic carbon (OC) and xenobiotics in clay and combined silt+sand fractions. It was shown that concentrations of OC associated with clay can be determined from linear relationships between OC and mineral specific surface area [2]. Two sets of experiments were conducted with undisturbed soil columns under field-like conditions. In the first set, maize straw was incorporated into the topsoil and after three months incubation the 14C-labelled xenobiotics benazolin or benzo[a]pyrene were applied. The second set was treated equally, but without maize addition.
The calculated distribution coefficients Kd indicated a stronger sorption of benzo[a]pyrene than benazolin derivates. Furthermore, the binding capacity for the xenobiotics was higher in the clay than in the silt+sand fraction due to the relative high specific surface area in the clay fraction. Incorporation of maize straw led to a significant retention and decrease of mobility of the acidic benazolin. The hydrophobic benzo[a]pyrene was less affected by the addition of organic amendment and remained in the topsoil.

[1] Schnitzler, F., Lavorenti, A., Berns, A.E., Drewes, N., Vereecken, H., Burauel, P., 2007. The influence of maize residues on the mobility and binding of benazolin: Investigating physically extracted soil fractions. Environmental Pollution 147, 4-13.
[2] Séquaris, J.-M., Guisado, M., Moreno, C., Burauel, P., Narres, H.-D., Vereecken, H., 2010. Organic carbon fractions in an agricultural topsoil assessed by the determination of the soil mineral surface area. Journal of Plant Nutrition and Soil Science, in press