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Occurrence of non extractable pesticide residues in physical and chemical fractions of two soils

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Soils are considered to be a significant sink for organic contaminants, including pesticides, in the environment. Understanding the distribution and localisation of aged pesticide residues in soil is of great importance for assessing the mobility and availability of these chemicals in the environment. This study aimed to characterise the distribution of radiolabeled herbicide isoproturon and the radiolabeled insecticides diazinon and cypermethrin in two organically managed soils. The soils were spiked and aged under laboratory conditions for 17 months. The labile fraction of the pesticides residues was recovered in CaCl2 (0.01M) and then subjected to physical size fractionation using sedimentation and centrifugation steps, with >20µm, 20-2µm and 2-0.1µm soil factions collected. Further, the distribution of the pesticide residues in the organic matter of the fractionated soil was investigated using a sequential alkaline extraction (0.1N NaOH) into humic and fulvic acid and humin. Soil fractions of 20-2µm and 2-0.1µm had the largest burden of the 14C-residues. Different soil constituents have different capacities to form non-extractable residues. Soil solid fractions of 20-2 μm and <2 μm had far greater affinity to the 14C-pesticide residues than the coarser fraction (>20 μm). Fulvic acid showed to play a vital role in the formation and stabilisation of non-extractable 14C-pesticide residues in most cases.Assessment of the likelihood of the pesticide residues to become available to soil biota requires an understanding of the structure of the SOM matrix and the definition of the kinetics of the pesticide residues in different SOM pools as a function of the time.