



Matching Application with Detection – A combined approach for pesticide monitoring on arable land using lysimeters and pressurized liquid extraction

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Soils from agricultural areas represent a major sink and potential secondary source for pesticides in the environment. Despite their biodegradability many agrochemicals are still observed in soils, groundwater as well as surface water bodies, even if application ceased decades ago (e.g. Atrazine). Where pollutants are stored, and which mechanism causes their persistence is largely unknown. In addition, data on the pollution status of both soil solid and liquid phases have rarely been collected on the same sites. The aim of this study is to determine the current state of pesticide pollution in contrasting soils (Luvisols, Cambisol-Pelosols) under different land use (organic farming, conventional farming) along with key solutes such as nitrate and dissolved organic carbon (DOC). By communicating with resident farmers and local authorities, target substance lists for the study sites were compiled and serve as indicators for pesticide detections. Soil water is extracted by tension-controlled suction plate lysimeters in two depths, below the plough horizon and above the parental material, to investigate water flow and further release of pesticides into the subsoil and across the rooting depth under actual environmental conditions. The setting of the lysimeters allows the farmers regular soil tillage including ploughing and management operations throughout the whole monitoring campaign. Soil sampling for the accompanying lab experiments was conducted after the growing season and before the next plant protection measures in subsequent spring. Soil samples were extracted using pressurized liquid extraction and pesticide residues were determined using LC-MS/MS analysis. First results indicate a clear connection between pesticide application details provided by farmers and findings in soil extracts, with lowest concentrations and absolute findings in the organic farming soil. However, Atrazine and some of its metabolites, particularly 2-hydroxy-Atrazine, were found in all soils investigated. Hence, although measures of integrated pest management were applied at the conventional farming sites, pesticides are still detected even years after their documented application.