



Study of glyphosate transport through suspended particulate matter

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The results have been produced in a project aiming to improve the water quality of the Layon locally supported by stakeholders involved in the implementation of the Water Framework Directive as the SAGE-Layon Aubance. The study site is a small vineyard catchment (2.2 ha) of the Loire Valley. The slopes of the study site are between 8 and 40% resulting in strong erosive episodes during rainy event. The main objective is to understand the transfer of pesticide residues to stream. Preliminary results have shown glyphosate can be found with high concentrations during runoff. However this study was realized only in the dissolved phase. The objective is now to understand the glyphosate transport driven by SPM. The methodology developed has been (i) characterization and production of the erodible water fraction from soils aggregates; (ii) achievement of the adsorption of glyphosate on these erodible materials to compare this results with adsorption on soil sieved to 2 mm, (iii) achievement of the desorption of glyphosate on these erodible materials.

Measurements have been performed on soil samples distinguishing weed or grassed soils. Soils are sieved to 2 mm or between 2 and 5 mm (to produce the erodible water fraction). Both fractions are then used to glyphosate sorption and desorption. The erodible fraction was produce with a wet sieving machine (eijkelkampt Method Kemper and Rosenau, 1986), using sieve porosity of 250 microns. The fraction obtained at 250 microns is considered to be the erodible water fraction and is used to study the adsorption and desorption of glyphosate. Kinetics has been first carried out then the isotherm to obtain the value of K_d . A ratio soil/solution of 1/5 was used. Successive desorption's method was chosen with a stirring time of 20 min, centrifugation at 6000 g and the supernatant in each desorption of 20 min is analyzed. This step is repeated 25 times.

The main results of the study are: (i) adsorption of glyphosate is rapid and almost complete (95% in 2 min). (ii) K_d obtained on the erodible fraction are two times higher than on 2 mm sieved soils. (iii) Desorption showed that glyphosate is desorbed from the erodible fraction at 40% after 25 desorptions.

The aim of this study was to show the potential transport of glyphosate through suspended particulate matter. The adsorption on the erodible fraction argued to a significant transport potential of glyphosate on this fraction. The desorption of glyphosate from the erodible water fraction have revealed that the adsorption of glyphosate is reversible but it is much slower. These results demonstrate that glyphosate may be stored on the erodible fraction and be transported by these fractions.

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