



Adsorption of metsulfuron methyl on the main horizons of a typical argiudoll

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Metsulfuron methyl (Methyl 2-(4-methoxy-6-methyl-1,3,5-triazin-2-ylcarbamoylsulfamoyl) benzoate) is an herbicide pertaining to the sulfonylureas group. It is used in wheat, barley and fallow, and is of systemic action post-emergent. Sorption studies have shown that it is weakly adsorbed to the soil, suggesting that it has a high leaching rate. In fact, it has been detected in groundwater in the southeast of Buenos Aires in concentrations up to $0.113 \mu\text{g L}^{-1}$. In this sense, the objective of this work is to determine the adsorption coefficients of metsulfuron methyl in the three main horizons of a typical Argiudoll, Mar del Plata series.

The adsorption isotherms were performed by shaking 2 g of soil in 10 ml of CaCl_2 (0.01M) at different concentrations of metsulfuron methyl (0, 0.2, 0.5, 1, 2, 5 mgL^{-1}). Six repeats were performed for each main horizon (A-B-C). The samples were incubated with agitation at 25°C for 24 hours to reach equilibrium, then centrifuged at 3000 rpm for 10 minutes, and an aliquot of the supernatant was extracted for quantification in UPLC MS/MS (Waters[®]). The experimental data were adjusted following the Freundlich model.

The percentage of metsulfuron methyl adsorption in the three horizons was less than 48% of the concentration initially applied. This molecule presented higher adsorption at horizon A, followed by B, and finally by C, with adsorption percentages differ between 48 and 35.5%, 31 and 22.5%, and 25 and 16%, respectively, for all initial concentrations.

The isotherms obtained are mostly type L, so the experimental data were adjusted following Freundlich's model. The K_f values obtained were 3.5 for horizon A, 1.7 for horizon B, and 1.15 for horizon C.

In general, the results obtained indicate that metsulfuron methyl has a low affinity for the soil under study, which is lower when descending into the soil profile. The low percentages of adsorption obtained could be indicators of the vertical transport of this molecule in the soil profile, constituting a risk of groundwater contamination.