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# The effects of pH on the adsorption and desorption mechanisms of Pharmaceutically Active Compounds (PhACs) in a tilled Arenosol

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Wastewater treatment technologies worldwide use only marginally reduce the number of organic micropollutants (e.g. pharmaceuticals) in treated wastewater. Treated wastewater is used for irrigation in semi-arid and Mediterranean areas. Most of the treated wastewater is discharged into surface water bodies In European Countries. The use of these water bodies for irrigation results in the presence of PhACs into the agro-environment. The ever-changing environment in the soils influences the adsorption of these compounds. One of the ever-changing environmental factors is pH. The pH can highly fluctuate in the rhizosphere during the whole growing season. Consequently, the study of the effect of this environmental factor should also be considered when assessing the environmental risk of PhACs.

The main questions of our research were: (a) How do root acids affect adsorption-desorption interactions?; (b) Are there synergistic effects during competitive adsorption of 17α-ethinyl estradiol (EE2), carbamazepine (CBZ), and diclofenac sodium (DFC)?

Studied compounds were tested in both single-compound adsorption and competitive adsorption and batch experiments. The adsorbents were from a calcareous, humic sandy soil used to grow lucerne. The sorption experiments were carried out at three different depths of the soil profile, where at the ploughed layer (0-20 cm), soil pH was adjusted to model the effect of ambient acids on sorption processes. Competitive adsorption tests were performed at both the original and the modified pH values. Adsorption isotherms were applied to estimate the model parameters using Langmuir, Freundlich, and Dubinin-Radushkevich model. According to our results, the pH changes influenced the sorption processes, especially the desorption. The outcome of our study could be able to estimate the behaviour of PhACs at different soil horizons of sandy agricultural soil.

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