



Simultaneous adsorption/desorption of quaternary ammonium herbicides by acid vineyard soils

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Competitive adsorption and desorption of three quaternary ammonium herbicides (paraquat, diquat, and difenzoquat) have been studied in four sandy-loam acid vineyard soils from NW Spain and Portugal. The soils present organic matter contents between 3 and 48 g kg⁻¹ and copper contents ranging from 25 to 107 mg kg⁻¹. Adsorption has been studied under equilibrium conditions in batch experiments, and kinetics were studied in a stirred-flow chamber. Adsorption and desorption followed a Freundlich model and kinetics were well described by the pseudo-first-order model. The retention capacity for the pesticides by the four soils followed the sequence: paraquat > diquat > difenzoquat. The different adsorption capacities of each soil were not related to pH, clay or organic matter contents, as could be expected, but rather to soil copper content. The results show that competition with copper for adsorption sites is an important factor in quaternary ammonium herbicides retention in soils with these characteristics.