



Sorption of diuron in Oxisol under biochar application

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The soil organic matter (SOM) can act as an adsorbent with high mitigation potential of diuron leaching, especially in sandy soils. The sorptive interaction between SOM and pesticides depends on their physicochemical characteristics. To this end, we hypothesized that biochar affects SOM fractions, providing greater physical and chemical interaction by increasing the reactivity (humic acid fraction) and molecular stability (humin), thus contributing to greater sorption of pesticides. This study aimed at determining the sorption and desorption kinetics of diuron in an Oxisol after biochar application. The experiment used a completely randomized block design. The samples were collected in an experimental field that combined two fertilization levels (0 and 400 kg ha⁻¹ 00-20-18 NPK fertilizer) and three biochar doses (0, 8 and 16 Mg ha⁻¹). The Batch Equilibrium method was used to evaluate sorption and desorption. We evaluated the sorption and desorption kinetics of diuron, total organic carbon, fulvic acid, humic acid and humin, pH and organic carbon partition coefficient. The Freundlich isotherm was adjusted to describe appropriately diuron sorption kinetics in all studied treatments. The application of biochar increased sorption (Kf) and decreased desorption of diuron by 64% and 44%, respectively. This effect is attributed to biochar contribution to total organic carbon and C-humin, and these with diuron through hydrophobic interactions and hydrogen bonds. The positive correlation between organic carbon partition coefficient and Kf confirms the importance of organic soil compartment in diuron sorption process. NPK fertilizer and diuron did not compete for the same sorption site. The increase in sorption and desorption reduced with the biochar application showed that biochar treatment can be an important alternative to avoid diuron leaching in the soil, especially in sandy soils.

Palavras-chave: leaching, persistence, soil organic matter, herbicide, pyrogenic carbon.

Apoio: CNPq