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ADSORPTION OF ROOT EXUDATES ONTO CORN STRAW-DERIVED BIOCHAR: CHARACTERIZATION AND ADSORPTION ISOTHERM STUDIES

Abstract:

This study aimed to evaluate the feasibility of using corn straw biochar for adsorption of the selected root exudates (organic acids) present in reused nutrient solution (RNS). Qualitative screening (GC/MS) of the RNS revealed the presence of fourteen organic acids and among all, benzoic and phthalic acids as the main inhibitors were selected for quantitative (HPLC) analysis. The biochar was prepared at temperature of 300 °C and the obtained biochar was subsequently characterized by SEM, BET and FTIR analysis. In order to evaluate the adsorption isotherm, Langmuir and Freundlich adsorption isotherm models were fit to the experimental data. The Langmuir model best represented the experimental data for both benzoic and phthalic acids, exhibiting high linear correlation coefficients ($R^2 \geq 0.98$). The study revealed this biochar is a promising alternative for granular activated carbon with respect to RNS recovery at a greatly reduced cost.

Keywords:

water treatment, biochar adsorption, Sustainable agriculture

JEL Classification: E02