

UTILIZATION OF PACARA EARPOD TREE (ENTEROLOBIUM CONTORTISILQUUM) AND IRONWOOD (CAESALPINIA LEIOSTACHYA) SEEDS AS LOW-COST BIOSORBENTS FOR REMOVAL OF BASIC FUCHSIN

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Abstract

Wastes from the Pacara Earpod tree (*Enterolobium contortisilquum*) and Ironwood (*Caesalpinia leiostachya*) seeds were studied as biosorbents for the removal of basic fuchsin from waters. Both biosorbents were prepared and characterized by different analytical methods. The characterization data showed that both materials were mainly composed of lignin, cellulose, and hemicellulose. Both biosorbents exhibited roughened surfaces and surface functional groups such as C-H, C=O, C=C, C-O, C-N, and OH bonds. Furthermore, the XRD pattern shows an amorphous phase with a wide peak from 10 to 30° due to the lignin. In terms of dosage and pH, the use of 1 g L⁻¹ and 9.0, respectively, is recommended. The initial concentrations for the biosorption kinetics ranged from 50 to 500 mg L⁻¹, where the Pacara ear and the Ironwood reached an adsorption capacity of 145.62 and 100.743 mg g⁻¹ for the 500 mg L⁻¹. The pseudo-second-order was found to be the proper model for describing biosorption of basic fuchsin onto Pacara Earpod tree and Ironwood, respectively. For the isotherm experiments, the maximum experimental biosorption capacity was found to be 166.858 and 110.317 mg g⁻¹ for the Pacara Earpod and Ironwood for the initial concentration of 500 mg L⁻¹ at 328 K. The Langmuir and the Tóth models were the best for representing the equilibrium curves for the basic fuchsin on the Pacara Earpod and the Ironwood, respectively. Maximum adsorption capacities of 177.084 mg g⁻¹ and 136.526 mg g⁻¹ were achieved for the Pacara Earpod tree and Ironwood, respectively. The biosorption process was spontaneous, endothermic, and favorable for both biosorbents. The biosorbents were also applied for coloration removal of simulated textile effluents, reaching 66% and 54% for the Pacara Earpod and Ironwood, respectively. For the final application, the materials were used in fixed-bed biosorption, with an initial concentration of 200 mg L⁻¹, reaching breakthrough times of 710 and 415 min, leading to biosorption capacities of the column of 124.5 and 76.5 mg g⁻¹, for the Pacara Earpod and Ironwood, respectively.

Keyword

Pacara earpod tree seeds; Ironwood; Basic fuchsin from the waters