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APPLICATION OF AGRO-INDUSTRIAL WASTE BIOMASS OF PLANTAIN (*Musa paradisiaca*) AND TANGERINE (*Citrus reticulata*) FOR SELECTIVE REMOVAL OF NITRATES FROM AGRICULTURAL WASTEWATER

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Abstract

The use of waste including agro-industrial waste or wastewater from various economic sectors is circular economy and is one way to deal with environmental challenges. Therefore, the objective of this work was to study the use of *Musa paradisiaca* and *Citrus reticulata* peels as valuable agents for nitrate removal in wastewater and to get nutrient rich organic compounds that can be used as an alternative to the scarcity of fertilizers. The lignocellulosic residues were collected from the hotel sector and subsequently pretreated with a washer, drying, and size reduction to be later characterized by SEM, EDS, and FTIR analysis. Additionally, batch adsorption was carried out, where the influence of several parameters such as contact time, amount of adsorbent, and temperature were studied. The results showed a 65% reduction in nitrates with *Musa paradisiaca* peels and 45% with *Citrus reticulata* peels. The adsorption isotherm data were better explained with the Sips model for the plantain peel and the Freundlich model for the tangerine peel, with maximum adsorption capacities of 62.52 and 59.39 mg/g, respectively, when the adsorption temperature was 318 K. The thermodynamic studies (ΔG° , ΔH° , and ΔS°) showed the spontaneous, endothermic, and random nature of the adsorption process. This affinity for the adsorption process was due to the presence of N-H, O-H, C-H and C-O functional groups of crystalline cellulose and cellulose, hemicelluloses or lignin polymer in the materials used. So, the implementation of these biomasses is promising to design a nutrient removal wastewater system, that could also serve as a fertilizer and reduce the environmental impact of agriculture waste.

Key words: agro-industrial wastes, fertilizer shortage, nitrates removal, wastewater treatment

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