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LANTANA CAMARA DILUTE ACID HYDROLYSIS

Optimization of Acid Hydrolysis of Lantana camara Biomass for Reducing Sugar Production toward Biofuels and Bioproducts

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Abstract

One of the most destructive invasive plant species is Lantana camara, which displaces native plants and changes ecosystem functions, leading to extensive ecological and economic damage. However, its fast replication and significant lignocellulosic biomass production create an opportunity for sustainable valorization via bioprocessing. The current work focuses on the process optimization of total reducing sugars as a prospective bio-based application derived from dilute acid hydrolysis of L. camara biomass. Hydrolysis was performed at a constant temperature of 120 °C and a solid loading of 1:10 (w/v). A systematic evaluation of the effects of acid concentration (0.5–3.0%) and residence time (15–60 min) was implemented. It was found that both parameters had a significant effect on sugar yield. The highest levels of combined reducing sugars were achieved at an acid concentration of 3% and residence time of 30 min. The pentose rich acid hydrolysate generated under optimized conditions can serve as suitable substrates for bioethanol production via modified ethanologenic strains, as well as bioproducts such as xylitol. The findings demonstrate an effective strategy for converting invasive biomass into renewable resources, offering a dual benefit of ecological management and sustainable bio-based production.

Keywords: Invasive weed management, Biomass valorization, Hemicellulose, Bioprocessing

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