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Biofuel Potential and Invasive Species Control: Exploring Prosopis Juliflora Pod Mash for Sustainable Energy Production

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Abstract : Fuels obtained from renewable resources have garnered significant enthusiasm in recent decades due to concerns about fossil fuel depletion and climate change. This study aimed to investigate the potential of Prosopis juliflora pods mash for bio-ethanol production and its hydrolysis solid waste for solid fuel. Various parameters, such as acid concentration, hydrolysis times, fermentation times, fermentation temperature, and pH, were evaluated for their impact on bio-ethanol production using Saccharomyces cerevisiae yeast. The results showed that increasing acid concentration (up to 1 molar H_2SO_4) led to an increase in sugar content, reaching a maximum of 96.13%v/v. Optimal conditions for bio-ethanol production were found at 1 molar H_2SO_4 concentration (4.2%v/v), 48 hours fermentation time (5.1%v/v), 20 minutes hydrolysis time (5.57%v/v), 30°C fermentation temperature (5.57%v/v), and pH 5 (6.01%v/v), resulting in a maximum bio-ethanol yield of 6.01%v/v. The solid waste remaining after bio-ethanol production exhibited potential for use as a solid fuel, with a calorific value of 18.22 MJ/kg. These findings demonstrate the promising potential of Prosopis juliflora pods mash for bio-ethanol production and suggest a viable solution for addressing disposal challenges associated with solid waste, contributing to the exploration of renewable fuel sources in the face of fossil fuel depletion and climate change.

Keywords : prosopis juliflora, pods mash, invasive species, bio-ethanol, fermentation, Saccharomyces cerevisiae, solid fuel
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