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Microwave-assisted organic acid pretreatment of starch based agro-residue: Assessment of fermentable sugar and bioethanol production

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Biofuels production continue to generate increasing interest as an alternative to fossil fuel more importantly the advanced biofuel production using agro industrial wastes as feedstock. Over the last decade, newer approach for sustainable and efficient utilization of agro-industrial residues to produce value added products such as biofuels and bioenergy has sparked a lot of interest. In South Africa, potato is regarded as one of the major vegetable crops with about 4% of the total production capacity in Africa; the resulting peels is normally disposed as waste contributing significantly to disposal problems and environmental pollution. In this study, the potential of potato peels waste as a feedstock for bioethanol production was investigated. Furthermore, a hybrid pre-treatment technique of microwave assisted organic acid was modeled and optimized using the response surface methodology. The input factors considered were microwave duration (min), microwave power (watt), acid concentration (%) and solid loading (%). A coefficient of determination (R2) of 0.90% was achieved indicating the fitness of the model. Optimum conditions of 10 min, 800 watt, 2.5% and 10% for microwave duration (min), microwave power (watt), acid concentration (%) and solid loading (%) respectively was achieved leading to a maximum reducing sugar yield of 56 g/l corresponding to a fermentable sugar yield of 0.85 g/g potato peels. Furthermore, the hydrolyzed potato peels waste was subjected to ethanol fermentation with and a maximum ethanol yield of 11 g/l was achieved. These results demonstrate the potential of potato peels waste for the production of fermentable sugar as feedstock for bioethanol production.

Biography

Funmilayo Faloye has recently completed her PhD from the University of KwaZulu-Natal, South Africa which focused on the optimization of bio hydrogen production leading to publications in reputable journals. For her Postdoctoral research, she is investigating integrated biofuel production systems from agricultural wastes in South Africa with focus on bioethanol and biogas. Her research interest includes bioprocess development, fermentation technology and biofuel production.

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