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Nutrient Load Optimization of Hydrothermal Hydrolysate Liquor from Coffee and Cassava Waste

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Abstract: Abstract: The growing utilization of agro-industrial byproducts presents both challenges and opportunities for developing countries. In the Philippines, cassava and coffee processing generate significant wastes, particularly cassava peel (CP) and coffee husk (CH). This study explored the production of nutrient-rich hydrolysate liquor from CP and CH through hydrothermal carbonization (HTC) at 190℃ for 30 minutes under varying blend ratios. The hydrolysate liquors obtained had mass yields ranging from 48.63% to 81.96% and exhibited acidic pH values (3.34-4.14). Elemental analysis showed that 100% CP produced the highest iron (89.4 mg/L) and magnesium (680.68 mg/L) concentrations, whereas 100% CH yielded the highest phosphate (520 mg/L) and phosphorus (169.59 mg/L) levels. The 50% CP–50% CH blend yielded the highest calcium content (616.15 mg/L). Optimization identified an optimal mixture of 73.8% CP and 26.2% CH, achieving less than 10% error between predicted and experimental values for most parameters, excluding ammonia and nitrogen. These findings highlight HTC as a viable approach for recovering inorganic nutrients from CP and CH, though further optimization is needed for consistency and potential application.

Key Words: hydrothermal carbonization; hydrolysate liquor; cassava peels; coffee husks; nutrient optimization.

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