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Integrated biorefinery of agricultural residues for the production of biofuels

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This study aims at investigating the use of sugarcane bagasse as feedstock in the production of clean renewable energy, ethanol and biocoal. Integrative processing technologies including acid pretreatment, enzyme hydrolysis, fermentation and hydrothermal carbonization were used for the co-production of ethanol and biocoal. Through optimizing enzyme hydrolysis and fed-batch fermentation processes, ethanol production from pretreated sugarcane bagasse was accomplished. Biocoal production from hydrothermal carbonization process was optimally produced from lignin-rich solid residue of enzyme hydrolysis process. Techno-economic assessment and life cycle analysis were also implemented on the integrated process to determine its economics and potential environmental impact. The integrated bioethanol/biocoal process could help stimulate interest on the use of agricultural residue for bioenergy production and consequently, mitigate the effect of climate change.

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