Biomethanation and Alkaline Wet Air Oxidation (AWAO) of Water Hyacinth (Pontederia crassipes) As a Post Weed Management Practice in Ozama River, Dominican Republic

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Yessica Castro

Masters Defense
Department of Biological Engineering

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Advisor - Dr. David Britt
david.britt@usu.edu

Full Abstract

Obtaining valuable products from environmental remediation waste is a sustainable approach that is capturing the attention of scientists worldwide. The production of biogas from anaerobic digestion is an ecologically friendly process that generally utilizes manure and agricultural waste as feedstock. Even though the anaerobic digestion of lignocellulosic feedstock has been previously reported, studies on the biomethanation of lignocellulosic biomass after aqueous pretreatments such as wet air oxidation, and aqueous ammonia are not found. Water hyacinth (Pontederia crassipes Mart.), is an invasive aquatic plant that grows in eutrophic water bodies. The use of this macrophyte as a feedstock for bioconversion processes has gain popularity due to its high growth rates, no use of arable land for cultivation, ability to grow in contaminated water, and phytoremediation properties.

In the present proposal, we assess the feasibility of using the invasive water hyacinth from the eutrophic waters of the Ozama River (Dominican Republic) as a feedstock for anaerobic digestion. In order to improve the biomethanation of water hyacinth, the effects of various aqueous pretreatments on the chemical composition and biochemical methane potential of this macrophyte are compared. In addition, the use of solid residues from thermochemical processing, such as biochar, as an aid for the biomethanation of unpretreated and pretreated water hyacinth is proposed. The execution of this research does not only generate valuable information for the scale-up of the water hyacinth’s biomethanation as a post weed management practice in eutrophic water bodies like Ozama river but also contributes to the development of sustainable ‘from waste to product’ technologies in developing countries like the Dominican Republic.