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Effect of Various Types of Thermal Pretreatment Techniques on the Hydrolysis, Compositional Analysis and Characterization of Water Hyacinth

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ABSTRACT

The aim of this work was to study the effect of four different types of thermal pretreatment techniques i.e., hot air oven, microwave, autoclave and hot water bath on the hydrolysis, compositional analysis and characterization of water hyacinth. To determine the most efficient thermal pretreatment technique exhibiting enhanced solubilisation. Highest solubilisation was achieved by hot air oven (55.5%), followed by microwave, hot water bath and autoclave. Bio-chemical methane potential (BMP) test of hot air oven pretreated and untreated water hyacinth was conducted. Cumulative methane production of 3039 ± 32 mL CH₄/ g VS was achieved by hot air oven pretreated water hyacinth at 90°C for 1 h which was way higher than the cumulative methane production of untreated water hyacinth 2396 ± 19 mL CH₄/ g VS on the 35th day. Compositional analysis and characterization of water hyacinth were also investigated to study the changes in the pretreated samples.

Keywords: Water hyacinth, lignocellulose, thermal pretreatment, hot air oven, bio-chemical methane potential.

1. Introduction

Water hyacinth is the world's worst aquatic weed (Dirar and El-Amin, 1988) as it can cover an entire aquatic body by forming thick compact carpet within 2-3 weeks (Malik, 2007). This thick carpet blocks the passage of sunlight underwater

thus, making existence difficult for aquatic organisms (Forrest et al., 2010). The water body, enveloped with water hyacinth carpet also obstructs various recreational and day to day human activities and is an excellent breeding platform for various

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