

EFFICACY OF DIFFERENT PRETREATMENTS ON *PARTHENIUM HYSTEROPHORUS* L. TO ENHANCE CELLULOSE RECOVERY FROM THE LIGNOCELLULOSIC BIOMASS

K. Niranjan^{1*#}, R. Kapilan¹, and P.N. Yapa²

¹Faculty of Science, University of Jaffna, Thirunelvely, Jaffna, Sri Lanka

²Faculty of Applied Sciences, Rajarata

University of Sri Lanka, Mihintale, Anuradhapura, Sri Lanka

*Correspondence E-mail: knranjan@univ.jfn.ac.lk, Phone: +94779113012

#Presenting Author

Abstract: This study was aimed to select a cost-effective pretreatment for aggressive colonizer *Parthenium hysterophorus* in order to utilize the lignocellulosic biomass for the production of cellulosic bioethanol. Deploying diverse pretreatment methods will enable to choose the efficient and economical path to cellulose recovery from the biomass. Pretreatment is necessary to expose the carbohydrate polymers buried in the interior of the cell wall and make them accessible to the hydrolytic enzymes during saccharification to yield appreciable levels of fermentable sugars subsequently producing ethanol. Dried ground powder of *Parthenium hysterophorus* biomass was subjected to fifteen different chemical (NaOH, H₂SO₄, Chlorocholine- oxalic acid, Performic acid, H₂O₂) and physical (autoclaving, microwave, dry heat in furnace, boiling) treatments of different combinations. The dry weight of cellulose and lignin was calculated for all the treated samples using gravimetric methods. This was further confirmed by subjecting the pretreated samples to Fourier Transform InfraRed Spectroscopy (FTIR) to examine the functional groups of the polysaccharide. Acid treatment (0.1-1.0% H₂SO₄) at 200°C provided comparatively higher cellulose yield, but it removed lignin less effectively than NaOH treatment. Microwave assisted NaOH and boiling with NaOH were found more effective than NaOH at room temperature. Based on the gravimetric estimation and FTIR analysis, boiling at 2% NaOH treated sample for 20 minutes, autoclaving at 2% NaOH treated sample for 20 minutes with sudden pressure release and microwave assisted 2% NaOH treatment at 280 W for three minutes were among the effective pretreatment methods of biomass investigated.

Keywords: Aggressive colonizer; Bioethanol; Cellulose; Lignocellulose; Lignin; Pretreatment