204/B

Evaluation of energy and mechanical properties of biomass briquettes produced with invasive *Eichornia crassipes* (Water hyacinth), wood residues and cow dung.

W.A.R.T.W. Bandara* and P. Kowshayini

Department of Zoology and Environmental Management, Faculty of Science, University of Kelaniya, Kelaniya, Sri Lanka.

Water hyacinth is an aggressive invasive species spread over 45% of fresh water bodies in Sri Lanka, and has considerable energy within.This study aims to identify the ideal proportion of the sawdust : water hyacinth and cow dung : water hyacinth ratios needed to produce briquettes for biomass boilers in industries. Raw materials were pre-processed to obtain 1-3mm particle size after drying, grinding and sieving. Pre-processed water hyacinth was mixed with sawdust in 25:75 (S1), 50:50 (S2) and 75:25 (S3) proportions and with cow dung in 25:75 (C1), 50:50 (C2) and 75:25 (C3) proportions. Briquettes were produced using screw type extruder briquetting technology and energy properties including moisture content, volatile matter content, ash content, fixed carbon, and calorific value, and mechanical properties including bulk density, compressed density, relaxed density, durability, water resistance capacity, and water boiling time were measured and fuel wood value indices (FVI) of briquettes were calculated. Three replicates were tested and the results were analyzed using one way ANOVA followed by Tukey's pair wise comparison. In sawdust - water hyacinth briquettes, there is no significant difference between three types for FVI and density. The S2 type has a significantly higher calorific value (19.17 kJ/g) and water resistance capacity (98.73%) and significantly lower moisture content (5.32%) and water boiling time (10 minutes). In cow dung - water hyacinth briquettes, the C2 type has a significantly higher FVI and volatile matter content (75.54%) and significantly lower moisture content (5.81%) and fixed carbon content (10.0%). Briquettes performance will be improved further if the screw type briquetting machine is modified to water hyacinth materials. In this study sawdust - water hyacinth briquettes S2 and in cow dung - water hyacinth briquettes C2 types are performing better. Biomass briquettes will contribute to fulfil energy requirements demanded by industries, as well as helping to control the growth of water hyacinth.

Keywords:Renewable energy, Water hyacinth, Biomass briquettes

rangika@kln.ac.lk Tel: +94 0710415285/ +94 0779899994