232/B

Evaluation of energy and mechanical properties of biomass pellets produced from above ground plant materials of rubber (*Hevea brasiliensis*).

W. A. R. T. W. Bandara and S. R. Leelarathna*

Department of Zoology and Environmental Management, University of Kelaniya, Kelaniya.

In Sri Lanka, there is a challenge of fulfilling the energy needs of the country with the increasing demand from industrial, household and commercial sectors, and at the same time having to face the adverse effect of overdependence on imported fossil fuel usage. The Sustainable Energy Authority of Sri Lanka is focusing on replacing fossil fuel by renewable energies including biomass energy with the target of energy independence by 2050. In fulfillingthe fuel wood requirementsof the country, rubber wood (*Hevea brasiliensis*) plays a major role, but its supply is not adequate to meet the demand. This study was designed to make use of rubber residues left from the rubber wood industry, including rubber leaves and rubber saw dust, by producing biomass pellets, and to identify the ideal proportion of rubber leaves to rubber saw dust to produce pellets to be used in biomass boilers in local industries. After sun drying for 24 hours, the collected rubber leaves and saw dust were processed into particles of 2mm in size. Rubber leaves and rubber saw dust were mixed in three different proportions: A- 25:75, B- 50:50, and C- 75:25 respectively. From each proportion five replicates were tested for each property.

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 pellets were calculated. Pellet type A has significantly higher FVI (12540) than pellet type B (4901) and pellet type C (5571.1). There is no significance difference in durability and water boiling time among pellet types. Pellet type A perform better in volatile matter content (90.35%) and fixed carbon content (7.6%). In comparing all the tested properties, pellet type A (rubber leaves to rubber saw dust 25:75) was identified as the best performing combination to be used in industrial boilers.

Keywords: Calorific value, Pellet, Fuel wood value indices

E-mail: rasanjali.sanduni@gmail.com