

Replacement of Firewood with Fruit and Vegetable Waste

Thilakshana, V.^{1*}, Edirisinghe, E.A.C.T.¹, Gunathilaka, U.S.A.¹, Bandara, W.M.M.D.¹

¹*Department of Food Technology, Faculty of Technology,
Rajarata University of Sri Lanka.*

**thilaxana1998@gmail.com*

In many developing countries, the prevalent use of firewood as the primary household energy source contributes to environmental issues like deforestation and habitat destruction. To tackle this, a study was conducted to create briquettes from fruit and vegetable waste, offering a sustainable and eco-friendly alternative to firewood. The research gathered fruit and vegetable waste from hostel canteens and markets in the Mihintale area. This waste was then sun-dried, ground, and combined with wheat starch as a binding agent in an 80:20 ratio, with a small amount of hot water (60°C) added for moulding. Two methods were used for moulding; manual compression and hydraulic compression. The results showed that briquettes made using the manual compression method had 8.85±0.68% moisture, 7.09±0.09% ash, 18.11±0.52% volatile matter, 65.03±1.65% fixed carbon, a bulk density of 0.171±0.006 g/cm³, a calorific value of 15.55±0.31 MJ/kg, and burned for 10.71 minutes. In contrast, briquettes produced through hydraulic compression exhibited superior characteristics: 6.88 ± 0.98% moisture, 6.66 ± 0.21% ash, 18.11±0.13% % volatile matter, a higher calorific value of 15.02±0.24 MJ/kg, extended burning duration of 11.35 minutes, reduced emissions and heightened combustion efficiency. These briquettes showed lower moisture and ash content, making them more environmentally friendly and efficient. Hydraulic compression also ensured consistent compaction, leading to higher-quality briquettes compared to the manual method. In conclusion, fruit and vegetable waste-derived briquettes demonstrate environmental sustainability and practical benefits. Hydraulic compression yields superior quality, showcasing the potential of waste for efficient, sustainable energy production.

Keywords: *Briquettes; Fruit and vegetable waste; Firewood; Eco-friendly; Calorific value; Alternative; Sustainability*