

**No. TA 1298/S1-TL/0126-P**

**TESTING OF RAMBUTAN PEEL BIO-PELLET  
– FUELED TOP-LIT UPDRAFT (TLUD) BIOMASS STOVE  
PERFORMANCE BASED ON SNI 7926:2013**

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**UNDERGRADUATE THESIS**

As one of the requirements to complete the  
Undergraduate Program at the  
Departement of Environmental Engineering  
Faculty of Engineering, Universitas Andalas

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## ABSTRACT

*This study aimed to assess the quality of rambutan peel biomass pellets as an alternative energy source in accordance with SNI 8675:2018 on Biomass Pellets for Energy, and to examine the performance of a Top-Lit Updraft (TLUD) biomass stove in accordance with SNI 7926:2013 on Biomass Stove Performance. The quality assessment of rambutan peel biomass pellets was conducted using proximate analysis. The amount of bio pellet used is 700 g with the same size. The results indicate that the rambutan peel bio-pellets exhibit a density of  $1.43 \pm 0.02$  g/cm<sup>3</sup>, a moisture content of  $9.72 \pm 0.04\%$ , volatile matter of  $63.72 \pm 0.01\%$ , ash content of  $3.32 \pm 0.02\%$ , and fixed carbon of  $23.22 \pm 0.03\%$ , and two parameters that did not meet the standard value, which are calorific value of  $16.39 \pm 0.005$  MJ/kg or  $3,915 \pm 1.53$  kcal/g, and sulfur content of  $0.17 \pm 0.002\%$ . Furthermore, it also shows that the combustion of rambutan peel biomass pellets in the Top-Lit Updraft (TLUD) biomass stove produced Particulate Matter 2.5 (PM<sub>2.5</sub>) emission factors of  $143.99 \pm 33.38$  mg/kg, carbon monoxide (CO) of  $5.94 \pm 1.11$  g/kg, and carbon dioxide (CO<sub>2</sub>) of  $134.69 \pm 1.92$  g/kg, which is not exceed the maximum value attached in SNI 7926: 2013. In general, the combustion characteristics of rambutan peel bio-pellets satisfy the reference standards for biomass furnace performance, except for combustion efficiency. Improvements in moisture content can be achieved through oven drying, while sulfur levels may be reduced by blending rambutan peel with other biomass materials containing lower sulfur concentrations.*

**Keywords:** *bio-pellets, combustion efficiency, emission factors, rambutan peel, TLUD biomass stove*