THE PERFORMANCE TEST OF BIOPELLETS FROM BIOMASS OF RICE HUSK WASTE AS AN ALTERNATIVE RENEWABLE FUEL

Rahman, Erliza Hambali and Dwi Setyaningsih

Department of Agroindustrial Technology, Faculty of Agriculture Engineering and Technology, Bogor Agricultural University, IPB Dramaga Campus, PO Box 220, Bogor, West Java, Indonesia.

Surfactant and Bioenergy Research Center – LPPM IPB

Phone +62 852 7435 7436, e-mail: rh89_ipb@yahoo.com

ABSTRACT

The abundance of rice husks in Indonesia is a potential source of biomass that can be converted into biomass pellet (biopellets). Pelletization can improve the quality and burning characteristic of the biomass. The purpose of this study is to improve the quality of rice husks biopellets by combining the rice husks powders and the rice husks charcoal. Carbonization process was done by using kiln drum whose height is 30 cm and diameter is 19 cm for ±5 hours at a temperature of 400°C. The percentage of rice husks charcoal used was 0%, 10%, and 20%. Densification process was done by pellet mill whose capacity is 300 kg/h with a dies diameter of 8 mm. Used cooking oil was added to the raw material for 4.77% w/w. Biopellets was sun-dried for 4 hours. Then, the physico-chemical properties and the combustion characteristics were tested. Mass and energy flows were measured by using method of input-output analysis for the biopellets production process. The results of this research showed that the addition of rice husk charcoal into the rice husk biopellet generated a different effect significantly to the moisture content, ash content, volatile matter, bulk density, and the heating value of rice husk biopellet, but there was no significant effect to the level of fixed carbon, firmness, consumption rate, and the efficiency of combustion. Based on the physico-chemical properties and the combustion characteristics, rice husk biopellets that contained 10% of husk charcoal has the best quality. It has 3.60% of moisture content, 17.47% of ash content, 72.86% of volatile matter, 9.68% of fixed carbon, and 728.43 kg/m³ of bulk density. The heating value of the biopellets was 4329.63 kcal/kg, while the firmness was 10.54 kg/cm². In addition, the consumption rate of the biopellets was 1.84 kg/h while the efficiency of combustion was 8.34%. The production of rice husk biopellets on a laboratory scale produced yield of 18.67%. Biopellets increased the heating value of rice husk for 25.49%.

Keywords: rice husk, biopellets, charcoal, pyrolysis.