ABSTRACT

As a tropical country and has a rapidly growing agricultural industry, Indonesia is one of the countries with a large availability of biomass and bio-energy resources. However, in fact, many Indonesians still use fossil fuels as their main energy source. The Central Statistics Agency (BPS) noted that the majority or 82.78% of Indonesian households used LPG gas fuel for cooking in 2021. There is a lot of biomass potential obtained from agricultural waste, plantations, and the remains of plants or trees that are easily found in rural areas. Thus, it is easier for people in rural areas to use biomass as fuel to replace the use of fossil fuels, in this case LPG, which has a limited amount.

This research presents a solution in utilizing biomass in the form of a biomass stove. Currently, biomass stoves have been widely available on the market made from various materials. In this study, the biomass stove was made using cement as the base material with a mixture of fly ash, clay, and perlite, and a frame made of galvanized plate. In testing the performance of the biomass stove, WBT can be used.

In this research, two experiments were conducted with the same method, namely WBT. The first experiment tested the performance of a conventional biomass stove with a cement biomass stove without using variations in air flow rates, and the second experiment tested the performance of a cement biomass stove with variations in air flow rates at speeds of 1 m/s, 2.5 m/s, and 5 m/s. The results of the conventional biomass stove performance test with a cement biomass stove showed that the thermal efficiency value of the conventional biomass stove was higher and the FCR value was lower compared to the cement biomass stove. However, the cement biomass stove was faster in boiling water and had a higher heat rate. In the experiment on variations in the primary air flow rate on the cement biomass stove, the results showed that the faster the primary air flow rate, the higher the FCR value, the higher the heat rate value, and the faster the boiling time. However, the highest efficiency value was obtained at an air flow speed of 2.5 m/s.

Keyword : Biomass, Stove, WBT.