

RINGKASAN

Krisis bahan bakar fosil mendorong pemanfaatan biomassa, khususnya limbah pertanian seperti tongkol jagung yang dapat dimanfaatkan secara optimal menjadi biopellet. Biopellet non-karbonisasi tongkol jagung menjadi solusi yang ramah lingkungan. Kualitas dari karakteristik biopellet ini perlu ditingkatkan dengan menambah metode *oil coating microparticle* berbasis minyak jelantah. Teknik ini bertujuan untuk meminimalkan penyerapan air yang berlebihan, sehingga meningkatkan kualitas biopellet. Penelitian bertujuan untuk 1) Mengetahui pengaruh perlakuan *oil coating microparticle* berbasis minyak jelantah terhadap karakteristik biopellet non-karbonisasi tongkol jagung. 2) Membandingkan kinerja biopellet dengan perlakuan *oil coating microparticle* berbasis minyak jelantah terhadap biopellet tanpa perlakuan pencelupan.

Penelitian ini dilaksanakan di Laboratorium Teknik Sistem Termal dan Energi Terbarukan (TSTET), Fakultas Pertanian Universitas Jenderal Soedirman. Prosedur penelitian diawali dengan persiapan alat dan bahan dan dilanjutkan pembuatan biopellet. Biopellet diberi perlakuan *oil coating microparticle* berbasis minyak jelantah. Percobaan uji menggunakan Rancangan Acak Lengkap (RAL) dengan faktor perlakuan waktu pencelupan minyak jelantah yang terdiri dari empat taraf: T0 (tanpa *coating*), T1 (10 detik), T2 (30 detik), dan T3 (50 detik). Variabel yang diamati meliputi laju pembakaran, kadar air, *volatile matter*, *shatter index*, kadar abu, densitas, dan nilai kalor. Data dianalisis dengan ANOVA (*Analysis of Variance*) pada taraf 5% dan hasil sidik ragam yang berbeda nyata maka dilakukan uji lanjutan dengan DMRT (*Duncan's Multiple Range Test*) pada taraf 5%.

Hasil skripsi ini meneliti pengaruh penggunaan minyak jelantah sebagai pelapis mikropartikel terhadap kualitas fisik dan daya tahan biopellet non karbonisasi. Hasil penelitian menunjukkan bahwa perlakuan pelapisan ini mampu meningkatkan sejumlah parameter penting biopellet, dengan variasi waktu pencelupan memberikan pengaruh berbeda terhadap karakteristik biopellet. Setiap perlakuan menunjukkan keunggulan pada variabel tertentu. Perlakuan ST0 menunjukkan nilai terbaik pada laju pembakaran, kadar air, dan kadar abu, pada perlakuan ST1 menunjukkan nilai terbaik pada nilai kalor dan *shatter index*, pada perlakuan ST2 menunjukkan nilai terbaik pada *volatile matter*, dan pada perlakuan ST3 menunjukkan nilai terbaik pada densitas.

SUMMARY

The fossil fuel crisis encourages the use of biomass, especially agricultural waste such as corn cobs that can be optimally utilized into biopellets. Non-carbonized corn cob biopellets are an environmentally friendly solution. The quality of the characteristics of biopellets needs to be improved by adding a used cooking oil-based microparticle oil coating method. This technique aims to minimize excessive water absorption, thereby improving the quality of biopellets. The study aims to 1) Determine the effect of used cooking oil-based microparticle oil coating treatment on the characteristics of non-carbonized corn cob biopellets. 2) Compare the performance of biopellets with the treatment of used cooking oil-based microparticle oil coating on biopellets without dyeing treatment.

This research was carried out at the Thermal Systems Engineering and Renewable Energy Laboratory (TSTET), Faculty of Agriculture, Jenderal Soedirman University. The research procedure begins with the preparation of tools and materials and continues with the manufacture of biopellets. Biopellets are treated with oil coating microparticles based on used cooking oil. The test experiment used a Complete Random Design (RAL) with a treatment factor of the dyeing time of used cooking oil consisting of four levels: T0 (without coating), T1 (10 seconds), T2 (30 seconds), and T3 (50 seconds). The observed variables included combustion rate, moisture content, volatile matter, shatter index, ash content, density, and calorific value. The data was analyzed with ANOVA (Analysis of Variance) at the level of 5% and the results of the fingerprints were significantly different, then a follow-up test was carried out with DMRT (Duncan's Multiple Range Test) at the level of 5%.

The results of this thesis examine the effect of the use of used cooking oil as a microparticle coating on the physical quality and durability of non-carbonized biopellets. The results showed that this coating treatment was able to increase a number of important parameters of the biopellets, with variations in dyeing time having different influences on the characteristics of the biopellets. Each treatment showed an advantage in a particular variable. The ST0 treatment showed the best value in the combustion rate, moisture content, and ash content, the ST1 treatment showed the best value in the calorific value and shatter index, the ST2 treatment showed the best value in volatile matter, and the ST3 treatment showed the best value in density.