RINGKASAN

Pengeringan gabah padi merupakan tahap penting dalam pascapanen, namun metode pengeringan konvensional yang bergantung pada kondisi cuaca menyebabkan intensitas cahaya matahari tidak stabil sehingga proses pengeringan kurang efisien dan sulit dikendalikan. Penelitian ini bertujuan untuk merancang dan mengimplementasikan sistem kontrol intensitas cahaya pada pengeringan gabah padi (*Oryza sativa* L.) menggunakan *Solar Dome Dryer* (SDD) berbasis *Internet of Things* (IoT). Sistem kontrol otomatis dilengkapi dengan sensor intensitas cahaya BH1750, mikrokontroler ESP32, *exhaust fan* dan *fan heater*, serta platform *Thingsboard* untuk pemantauan kondisi pengeringan secara *real-time*. Pengujian dilakukan pada gabah padi biasa, padi merah, padi ketan putih, dan padi ketan hitam dengan pengambilan data intensitas cahaya setiap 15 menit, dan kadar air gabah setiap satu jam sekali hingga mencapai kadar air akhir sekitar 12%.

Hasil kalibrasi menunjukkan bahwa sensor BH1750 memiliki akurasi yang baik dengan nilai MAE sebesar 95,45 lux. Sistem kontrol akan otomatis aktif berdasarkan ambang batas intensitas cahaya yang sudah ditentukan, yaitu *exhaust fan* aktif ketika intensitas cahaya >500 lux, sedangkan *fan heater* aktif ketika intensitas cahaya ≤500 lux. Hasil penelitian menunjukkan intensitas cahaya matahari di dalam SDD secara signifikan lebih rendah dibandingkan lingkungan luar, namun tetap efektif dalam mendukung proses pengeringan akibat akumulasi panas di dalam kubah. Pengeringan menggunakan SDD mampu menurunkan kadar air gabah dalam waktu yang lebih singkat dan lebih stabil dibandingkan metode konvensional. Analisis laju pengeringan (*Drying Rate*/DR) terhadap waktu serta hubungan antara ln(*Moisture Ratio*/MR) dan waktu pengeringan menunjukkan bahwa proses pengeringan berlangsung pada periode laju menurun yang dikendalikan oleh difusi internal. Hal ini menunjukkan sistem kontrol intensitas cahaya berbasis IoT pada SDD berpotensi menjadi solusi pengeringan gabah padi yang lebih efisien, terkendali, dan mendukung pertanian berkelanjutan.

Kata kunci : Gabah Padi, Intensitas Cahaya, *Internet of Things*, Sistem Kontrol, *Solar Dome Dryer*

SUMMARY

Drying rice grain is an important stage in post-harvest, however conventional drying methods which depend on weather conditions cause the intensity of sunlight to be unstable so that the drying process is less efficient and difficult to control. This research aims to design and implement a light intensity control system for drying rice grain (Oryza sativa L.) using a Solar Dome Dryer (SDD) based on the Internet of Things (IoT). The automatic control system is equipped with a BH1750 light intensity sensor, ESP32 microcontroller, exhaust fan and fan heater, as well as a Thingsboard platform for real-time monitoring of drying conditions. Tests were carried out on ordinary rice grain, red rice, white sticky rice and black sticky rice by taking data on light intensity every 15 minutes, and grain moisture content every hour until it reached a final moisture content of around 12%.

The calibration results show that the BH1750 sensor has good accuracy with an MAE value of 95.45 lux. The control system will automatically activate based on a predetermined light intensity threshold, namely the exhaust fan is active when the light intensity is >500 lux, while the heater fan is active when the light intensity is ≤500 lux. The research results show that the intensity of sunlight inside the SDD is significantly lower than the outside environment, but is still effective in supporting the drying process due to heat accumulation inside the dome. Drying using SDD is able to reduce grain moisture content in a shorter time and is more stable than conventional methods. Analysis of the drying rate (Drying Rate/DR) against time as well as the relationship between ln (Moisture Ratio/MR) and drying time shows that the drying process takes place in a period of decreasing rate which is controlled by internal diffusion. This shows that the IoT-based light intensity control system on SDD has the potential to be a solution for drying rice grain that is more efficient, controlled and supports sustainable agriculture.

Keywords : *Control System, Internet of Things, Light Intensity, Rice Grain, Solar Dome Dryer*