

OPTIMALISASI SISTEM PENGELOLAHAN LIMBAH MENJADI PUPUK ORGANIK CAIR DENGAN MENERAPKAN KONTROL SUHU DAN KELEMBAPAN

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ABSTRACT

Waste, particularly cattle manure, is one of the waste materials that can be utilized to produce liquid organic fertilizer (LOF). This study aims to develop a waste management system that processes waste into liquid organic fertilizer based on two main environmental factors: temperature and humidity. The system operates with the assistance of an ESP8266 microcontroller to monitor the temperature and humidity of the liquid organic fertilizer. The primary focus of this research is to maintain optimal conditions for the decomposers or microbes by keeping the temperature below **35°C–40°C** to prevent microbial mortality, while ensuring the humidity level remains above 50%. Additionally, the system incorporates automated controls via a water pump and a cooling fan that operate based on temperature and humidity values to keep the decomposer environment stable. A web-based interface built with the Laravel framework was developed using the fuzzy logic method to control the water pump and fan. In a system simulation conducted on Google Colab under ideal conditions, the water pump and fan successfully helped maintain consistent temperature and humidity levels to support decomposer growth. In the future, this system can be further developed by increasing the number of water pumps, fans, and temperature sensors to expand the production capacity of liquid organic fertilizer (LOF).

Keywords: Decomposer, *Fuzzy*, Google Colab, Laravel, Microcontroller, Liquid Organic Fertilizer (LOC).