

IMPLEMENTASI FUZZY MAMDANI DALAM SISTEM PENDUKUNG KEPUTUSAN UNTUK OPTIMALISASI BUDIDAYA TANAMAN MELON PADA GREENHOUSE POLIJE

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ABSTRACT

Fluctuating environmental conditions such as temperature, humidity, and soil pH can hinder the optimal growth of melon plants. This study implements the Fuzzy Mamdani method in a Decision Support System (DSS) to optimize melon cultivation in a greenhouse environment. The system monitors real-time conditions using temperature, humidity, and soil pH sensors, then provides automatic recommendations through LED indicators and a web interface. Defuzzification results are sent to Firebase to trigger appropriate responses based on the environmental conditions. Testing shows that the system delivers highly accurate recommendations aligned with expert decisions, with low Mean Squared Error (MSE) values: 0.00648 for blower, 0.00462 for spray, and 0.02028 for fertilizer. Sensor calibration results also demonstrate high accuracy: 98.80 percent for room temperature, 94.6 percent for soil moisture, and 95.17 percent for soil pH. Based on Blackbox Testing, all system functions operated according to the predefined scenarios, achieving a one hundred percent (100%) success rate, which confirms the system's stability and reliability in responding to various environmental conditions. This system effectively supports fast and accurate decision-making and has strong potential for further development.

Keywords: *Greenhouse, Fuzzy Mamdani, Melon, DSS, Temperature, Soil Humidity, Soil pH, Firebase, LED Indicator.*