

RANCANG BANGUN PENGENDALIAN SUHU DAN KELEMBABAN UDARA PADA INDOOR GREENHOUSE BERBASIS MIKROKONTROLER ARDUINO UNO

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ABSTRAK

Penelitian ini bertujuan untuk merancang sistem pengendalian suhu dan kelembaban udara pada *greenhouse indoor* berbasis mikrokontoler *Arduino Uno*, dan melakukan uji coba sistem *on/off* pada sistem pengendalian tersebut. Alat pengendali suhu berupa *exhaust fan* serta alat pengendali RH berupa *humidifier* yang terbuat dari alat *moist maker*, *fan* DC dan botol bekas. Penelitian ini menggunakan metode eksperimental dengan percobaan di Laboratoium Teknik Konservasi dan Lingkungan Pertanian Fakultas Teknologi Pangan dan Agroindustri Universitas Mataram. Data yang dihasilkan kemudian dianalisis menggunakan aplikasi Ms. Excel. Tanaman sawi pada *greenhouse indoor* diberikan cahaya LED biru 25 Watt dengan intensitas mencapai 1300-1500 lux. Hasil kalibrasi 3(tiga) buah sensor suhu DHT11 pada air hangat dengan *Hygrometer* menunjukkan nilai MAPE (*Mean Absolute Percentage Error*) masing-masing sebesar 3,58%; 1,55%; 3,73%. Kemudian hasil kalibrasi 3(tiga) buah sensor RH DHT11 dengan *Hygrometer* pada RH ruangan menunjukkan nilai MAPE (*Mean Absolute Percentage Error*) masing-masing sebesar 0,81%; 0,77%; 0,95%. Pengujian dilakukan dengan menggunakan tanaman dan tanpa menggunakan tanaman. Pada *setting point* suhu 28°C mengalami fluktuasi sebesar 1°C; untuk *setting point* RH 80% penurunan RH terendah sebesar 72% dan maksimal sebesar 92%. Pengendalian suhu membutuhkan waktu 30-90 menit untuk menurunkan suhu, sedangkan pengendalian RH membutuhkan waktu kurang dari 5 menit untuk menaikkan RH. Hasil pengujian ini alat pengendali suhu dan RH efektif menjaga kondisi suhu dan RH *indoor greenhouse*.

Kata kunci: *indoor greenhouse*, kelembaban relatif, mikrokontroler Arduino Uno, suhu

DESIGN AND CONSTRUCTION OF TEMPERATURE AND AIR HUMIDITY CONTROL SYSTEM ON INDOOR GREENHOUSE BASED ARDUINO UNO MICROCONTROLLER

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ABSTRACT

This study aimed to design a temperature and air humidity control system on indoor greenhouse the based Arduino Uno microcontroller, and test the on/off system of the control system. The temperature control device was an exhaust fan and the RH controller was humidifier that made from moist maker, fan DC, and used bottle. This study used experimental method with experiments at the Laboratory of Agricultural Conservation and Environment Engineering, Faculty of Food and Agroindustrial Technology, University of Mataram. The produced data was then analysed using Ms. Excel application. Mustard plants in the indoor greenhouse were given 25 watt blue LED light with intensity of 1300-1500 lux. The calibration results of the three DHT11 temperature sensors in warm water with hygrometer showed that value of MAPE (Mean Absolute Percentage Error) was equal to 3.58%, 1.55%, and 3.73%. The results of DHT11 sensor calibration with hygrometer at ambient RH showed that value of MAPE (Mean Absolute Percentage Error) was equal to 0.81%, 0.77%, 0.95%. The test was carried out by using plants and without using plants. At 28°C setting point, the temperature fluctuated by 1°C; for the 80% RH setting point, the lowest RH reduction was 72% and maximum 92%. Temperature control need 30-90 minutes to reduce the temperature, while RH control need less than 5 minutes to increase RH. Result of test device temperature and air humidity control was effective to keep stable temperature and air humidity in the indoor greenhouse.

Keywords: indoor greenhouse, relative humidity, Arduino Uno mikrokontroler, temperature