ABSTRAK

Buah melon termasuk salah satu buah favorit yang sudah akrab bagi mayoritas penduduk Indonesia namun memerlukan sinar matahari agar buah yang dihasilkan besar dan manis. Greenhouse Institut Teknologi Telkom Surabaya membudidayakan tanaman melon, namun iklim kota Surabaya yang berubah-ubah dapat mempengaruhi intensitas cahaya yang diterima tanaman dan menyebabkan kekurangan kebutuhan cahaya untuk fotosintesis. Selain tingkat intensitas cahaya, pemilihan spektrum warna untuk fase pertumbuhan tertentu juga mempengaruhi pertumbuhan tanaman. Sinar biru baik untuk mempertahankan proses vegetatif tanaman dan sinar merah baik untuk meningkatkan proses generatif tanaman. Greenhouse Institut Teknologi Telkom Surabaya memiliki lampu LED berwarna ungu yang hanya dapat dikendalikan secara manual. Oleh karena itu, tujuan dari Tugas Akhir ini membuat sistem monitoring dan pengaturan intensitas cahaya pada greenhouse berdasarkan spektrum warna fase pertumbuhan tanaman melon untuk tumbuh kembang tanaman melon. Metode Fuzzy Mamdani dipilih untuk menentukan aturan presentase warna lampu sesuai intensitas cahaya dan fase pertumbuhan tanaman melon. Input Fuzzy adalah intensitas cahaya dan fase pertumbuhan dan output Fuzzy adalah presentase warna lampu LED merah, biru dan putih. Aturan Fuzzy apabila intensitas cahaya gelap dan fase pertumbuhan tanaman memasuki fase vegetatif maka LED biru akan lebih dominan, sedangkan apabila fase generatif maka LED merah lebih dominan. Hasil pengujian nyala lampu pada fase vegetatif akan menyalakan lampu biru dengan domain terang dan kedua warna lainnya menyala agak terang, sedangkan pada fase generatif lampu merah akan menyala dengan domain terang dan kedua warna lainnya menyala agak terang. Hasil pengujian diperoleh rata-rata akurasi sistem dengan simulasi MATLAB output lampu LED biru akurasi 99.92% dengan galat error 0.08%, output lampu LED merah akurasi 99.74% dengan galat error 0.26% dan output lampu LED putih akurasi 99.95% dengan galat error 0.05%. Seluruh data dimonitoring melalui website *online* sehingga bisa diakses dimana saja.

Kata Kunci: Fuzzy, Intensitas Cahaya, Melon.

ABSTRACT

Melon is one of the favorite fruits familiar to the majority of the Indonesian population, but it requires sunlight for the resulting fruit to be large and sweet. The Greenhouse of Institut Teknologi Telkom Surabaya cultivates melon plants, but the fluctuating climate of Surabaya city can affect the light intensity received by the plants, causing a deficiency in the light requirements for photosynthesis. Apart from the light intensity level, the selection of color spectrum for specific growth phases also influences plant growth. Blue light is good for maintaining vegetative processes in plants, while red light is beneficial for enhancing generative processes. The Greenhouse of Institut Teknologi Telkom Surabaya currently utilizes purple LED lights that can only be manually controlled. Therefore, the objective of this Final Project is to create a monitoring and light intensity control system in the greenhouse based on the color spectrum suitable for the growth phases of melon plants, to facilitate their development. The Fuzzy Mamdani method is chosen to determine the rules for the percentage of light colors corresponding to the intensity of light and the growth phase of the melon plants. The Fuzzy inputs are light intensity and growth phase, while the Fuzzy outputs are the percentages of red, blue, and white LED lights. The Fuzzy rules dictate that if the light intensity is low and the plant is in the vegetative phase, the blue LED will be more dominant; however, if it is in the generative phase, the red LED will be more dominant. The results of the lamp activation testing during the vegetative phase will turn on the blue lamp in a bright domain, while the other two colors will be lit moderately bright. On the other hand, during the generative phase, the red lamp will light up in a bright domain, with the other two colors also lit moderately bright. The average accuracy of the system using MATLAB simulation shows that the accuracy of the blue LED lamp output is 99.92% with an error margin of 0.08%, the accuracy of the red LED lamp output is 99.74% with an error margin of 0.26%, and the accuracy of the white LED lamp output is 99.95% with an error margin of 0.05%. All data is monitored through an online website, allowing access from anywhere.

Keywords: Fuzzy, Light Intensity, Melon.