

ABSTRACT

One of the citrus-producing regions in West Java is located in Cigugur Girang village, managed by the Makmur Sadulur farmer group, cultivating a type of orange known as 'jeruk primong'. Presently, this region is confronting a significant challenge, characterized by the deteriorating condition of citrus plants due to the use of pesticides as a means to combat pest infestations. This phenomenon is evident through symptoms such as rapid yellowing and shedding of citrus leaves, along with a decrease in the sweetness of the fruit. In the context of continuous technological advancement, addressing this situation necessitates proactive measures. Therefore, a device capable of monitoring the environmental conditions of citrus plantations becomes imperative to empower farmers to undertake appropriate corrective actions. Furthermore, integrating the device within the framework of the Internet of Things (IoT) allows farmers to access the data generated from the monitoring process. This integration is expected to facilitate farmers in overseeing environmental conditions based on the accumulated data.

Based on the essential requirements, our primary goal is to realize effective monitoring of the growth environment for citrus plants. The primary features sought in the device encompass the capacity to measure both soil and ambient air temperatures, the ability to identify the levels of nitrogen, phosphorus, and potassium (NPK) within the soil, the measurement of soil and ambient air humidity levels, the detection of ambient light intensity, convenient portability for mobility and efficient storage during inactivity, resilience to moisture, and flexibility in power supply replenishment.

The outcomes of the design process reveal that the citrus plantation monitoring device is capable of detecting NPK values within the range of 0 - 255 mg/kg, recording air temperature within the range of 15 - 30°C, capturing air humidity levels within the range of 30 - 90%, detecting light intensity values within the range of 0 - 1500 lux, and measuring soil pH values within the range of 3 - 9 pH. Test results also indicate that the monitoring device can record each data set with a transmission interval spanning 20 - 40 seconds. These data can be remotely accessed through a smartphone using the Internet of Things (IoT) framework.

By understanding the environmental conditions, it is anticipated that citrus production will witness an elevation, and the integration of modern technology within the agricultural sector will be advanced. Despite challenges in IoT implementation, such as data transmission delays and calibration accuracy for effective monitoring, the citrus plantation monitoring device is poised to serve as a promising initial step toward optimizing citrus cultivation and sustainability within other agricultural domains.

Keywords: Agriculture, Environment, Citrus, IoT.