

The Development of a Precision Irrigation System for Durian

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Abstract : Durian is one of the top agricultural products exported by Thailand. There is the massive market potential for the durian industry. While the global demand for Thai durians, especially the demand from China, is very high, Thailand's durian supply is far from satisfying strong demand. Poor agricultural practices result in low yields and poor quality of fruit. Most irrigation systems currently used by the farmers are fixed schedule or fixed rates that ignore actual weather conditions and crop water requirements. In addition, the technologies emerging are too difficult and complex and prices are too high for the farmers to adopt and afford. Many farmers leave the durian trees to grow naturally. With improper irrigation and nutrient management system, durians are vulnerable to a variety of issues, including stunted growth, not flowering, diseases, and death. Technical development or research for durian is much needed to support the wellbeing of the farmers and the economic development of the country. However, there are a limited number of studies or development projects for durian because durian is a perennial crop requiring a long time to obtain the results to report. This study, therefore, aims to address the problem of durian production by developing an autonomous and precision irrigation system. The system is designed and equipped with an industrial programmable controller, a weather station, and a digital flow meter. Daily water requirements are computed based on weather data such as rainfall and evapotranspiration for daily irrigation with variable flow rates. A prediction model is also designed as a part of the system to enhance the irrigation schedule. Before the system was installed in the field, a simulation model was built and tested in a laboratory setting to ensure its accuracy. Water consumption was measured daily before and after the experiment for further analysis. With this system, the crop water requirement is precisely estimated and optimized based on the data from the weather station. Durian will be irrigated at the right amount and at the right time, offering the opportunity for higher yield and higher income to the farmers.

Keywords : Durian, precision irrigation, precision agriculture, smart farm

Conference Title : ICPFTA 2023 : International Conference on Precision Farming Technologies and Applications

Conference Location : Tokyo, Japan

Conference Dates : May 22-23, 2023