

Optimizing Turmeric (*Curcuma domestica*) Production through Digital Monitoring and Precision Agriculture: A Study on the Usage of Smart-climatic Agricore Platform

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Turmeric is a crucial crop, and optimal water quantity and a temperate environment are vital for rhizome production and plant metabolism. This research study was conducted in Negombo region to investigate the potential of precision agriculture in optimizing turmeric (*Curcuma longa*) production. This study utilized the Smart-climatic SenzAgro Agricore platform to monitor various parameters including relative humidity, temperature, electron conductivity, and soil moisture in the deep root system, which is critical for managing water. SenzAgro platform builds for general precision agriculture specifications. However, to prove a high impact, SenzAgro mainly focuses on high-value crops. The research design involved a randomized complete block design with three replicates. The study area was divided into three blocks, each containing a treatment plot (1,011.71m²) and a control plot, where common agronomic practices were carried out manually. The local turmeric variety was selected for cultivation, and plant behavior was monitored from the vegetative stage to the harvesting stage between September and December 2022. The initial plant density was 0.59 plants per square meter, and the entire experimental setup was located in the same geographical region. During the study period, the Smart-climatic SenzAgro Agricore platform continuously recorded climatic and soil moisture data for the treatment plots, while manual readings were taken for the control plots. The data collected from the experiments were statistically analyzed using 'python software'. The results revealed that the harvest obtained from the treated plots was 66.9%, significantly higher than the harvest obtained from the control plots. This research demonstrates the importance of precision agriculture methods in optimizing turmeric production. The SenzAgro Smart-climatic Agricore platform provides an effective solution for monitoring and managing critical parameters in turmeric cultivation. Moreover, the study proposes a cloud platform with a web-based interface and a simple sensor-based method for real-time and accurate climatic investigations. The new knowledge created in this study emphasizes the potential benefits of modernized digital monitoring and precision agriculture for optimizing crop production.

Keywords: Automated irrigation, Digital monitoring, Micro-climatic data, Turmeric