

***Rice Pest Attack Prediction System Based on Climate Data Using Random
Forest Algorithm***

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ABSTRACT

Rice is the primary food commodity in Indonesia, with more than 90% of the population consuming it as a staple food. However, efforts to increase its productivity are continuously threatened by climate change, which influences the intensity of plant-disturbing organism (PDO) attacks. Brown Planthopper (BPH) and Stem Borer infestations have been identified as the primary threats to rice productivity. This study develops a climate-based prediction model for rice pest attack area using the Random Forest algorithm with the CRISP-DM methodology, and implements it in a website-based prediction system. Climate data comprising temperature, humidity, and rainfall were obtained from NASA POWER, while pest attack data were obtained from the DTPHP of Jember Regency covering the period 2020–2024. Evaluation results show that the Stem Borer model achieved an MAE of 0,1804 ha, RMSE of 0,2879 ha, and R^2 of 0,1890, while the BPH model yielded an MAE of 0,1954 ha, RMSE of 0,3157 ha, and R^2 of 0,0424. The website system was developed using the Laravel framework and FastAPI. This system is intended to serve as an early warning tool that estimates the tendency of pest attacks in the upcoming growing season based on current climate conditions.

Keywords: *Random Forest, Rice Pest Attack Prediction, Early Warning System, NASA POWER*