Deteksi Kesesuaian Perlakuan pada Mutagenesis EMS Menggunakan Metode *Random Forest*

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ABSTRACT

This study explores the application of machine learning, specifically the Random Forest algorithm, to detect the suitability of treatments in ethyl methanesulfonate (EMS) mutagenesis for plant breeding. EMS mutagenesis is a widely used technique to induce genetic variation in plants, but its random nature often leads to unpredictable outcomes, posing challenges for researchers and breeders in determining optimal treatment parameters. The primary objective of this research is to develop a machine learning model capable of predicting the suitability of EMS treatments for specific seeds based on historical treatment data. Additionally, the study aims to build a system that provides researchers with recommendations for the best treatment parameters for a given seed type. By integrating machine learning into the mutagenesis process, this research seeks to enhance the efficiency of developing superior plant varieties, reduce time and costs, and contribute to addressing future challenges in food security and agricultural sustainability. The model achieved an accuracy of 80.9% under optimal conditions, demonstrating its potential to assist in the selection of effective EMS treatments. Furthermore, the model can be updated through retraining with new data, ensuring that treatment parameter recommendations remain accurate as more experimental data becomes available. This research highlights the importance of leveraging technology to improve plant breeding practices and offers a practical tool for researchers in the field.

Keywords: *machine learning*, *random forest*, *plant breeding*, mutagenesis, *ethyl methanesulfonate*, *treatment detection*.