

ABSTRAK

Penyakit pada daun cabai merupakan salah satu faktor utama penurunan produktivitas tanaman cabai di Indonesia. Deteksi dini secara manual memerlukan waktu lama dan bergantung pada keahlian petani. Penelitian ini bertujuan untuk mengembangkan sistem deteksi dini penyakit daun cabai berbasis citra digital menggunakan *You Only Look Once* (YOLOv8) yang berbasis Convolutional Neural Network (CNN). Penelitian dilakukan dengan mengumpulkan *dataset* sebanyak 1,283 citra daun cabai dari lahan petani di Provinsi Aceh yang terdiri dari empat kelas, yaitu: daun sehat, daun keriting (*Pepper Yellow Leaf Curl Virus*), daun kuning, dan bercak daun (*Cercospora capsici*). *Dataset* dibagi menjadi data latih (70%), validasi (20%), dan uji (10%). Penelitian berhasil mengembangkan sistem deteksi penyakit daun cabai berbasis citra menggunakan metode CNN yang mampu mengidentifikasi empat kategori daun, yaitu daun sehat, daun keriting, daun kuning, dan bercak daun. Model yang telah dilatih mampu melakukan deteksi secara otomatis dan *real-time* terhadap citra daun cabai yang diberikan sebagai input. Berdasarkan hasil pengujian dan akurasi model, model memperoleh nilai *Precision* sebesar 61,2%, *Recall* sebesar 56,6%, F1-score sebesar 57%, mAP@50 sebesar 56,2%, dan akurasi sebesar 64%. Kelas daun sehat memperoleh performa terbaik dengan nilai mAP sebesar 69,6%, sedangkan kelas daun kuning memperoleh performa terendah dengan nilai mAP sebesar 29,7%.

Kata Kunci: Deteksi penyakit daun cabai, YOLOv8, Convolutional Neural Network, *Computer Vision*, *Deep Learning*, Citra Daun.

ABSTRACT

Chili leaf disease is a primary factor contributing to reduced chili plant productivity in Indonesia. Manual early detection is time-consuming and relies heavily on the farmer's expertise. This study aimed to develop an image-based early detection system for chili leaf diseases using the You Only Look Once (YOLOv8) algorithm, which is based on Convolutional Neural Networks (CNN). The research involved compiling a dataset of 1,283 chili leaf images from farms in Aceh Province, categorized into four classes: healthy leaves, curled leaves (Pepper Yellow Leaf Curl Virus), yellow leaves, and leaf spot (Cercospora capsici). The dataset was split into training (70%), validation (20%), and testing (10%) sets. The study successfully developed a CNN-based image detection system capable of identifying the four leaf categories. The trained model performs automatic, real-time detection on input chili leaf images. Based on testing results and model accuracy, the model achieved a Precision of 61.2%, Recall of 56.6%, F1-score of 57%, mAP@50 of 56.2%, and an accuracy of 64%. The healthy leaf class demonstrated the best performance with an mAP of 69.6%, while the yellow leaf class showed the lowest performance with an mAP of 29.7%.

Keywords: Chili leaf disease detection, YOLOv8, Convolutional Neural Network, Computer Vision, Deep Learning, Leaf Image