

Intisari

Cengkih merupakan salah satu komoditas unggulan Indonesia yang sedang mengalami permasalahan kerugian akibat organisme pengganggu tumbuhan (OPT). Penyakit Sumatra yang disebabkan *Ralstonia syzygii subsp. syzygii* merupakan salah satu ancaman utama bagi produktivitas tanaman cengkih (*Syzygium aromaticum* L.). Deteksi dini penyakit Sumatra pada tanaman cengkih (*Syzygium aromaticum* L.) sangat penting untuk mendukung pengelolaan terpadu dan mengurangi kerugian produksi. Penelitian ini membandingkan akurasi deteksi penyakit menggunakan sensor *Red Green Blue* (RGB) dan *Red Green Near Infrared* (RGN) berbasis indeks vegetasi dari foto udara. Studi dilakukan dengan pengambilan data *ground truth* dan foto udara pada 120 sampel tanaman. Indeks vegetasi yang digunakan meliputi *visible atmospherically resistant index* (VARI) dan *normalized difference vegetation index* (NDVI). Analisis data mencakup *visual assessment*, regresi linear sederhana, regresi linear berganda, *random forest regressor*, dan *manual thresholding*, dengan evaluasi akurasi menggunakan *confusion matrix*, dan *absolute percentage error* (APE). Hasil menunjukkan hasil prediksi regresi linear berganda dengan transformasi data Box-Cox pada sensor RGN memberikan akurasi tertinggi, yaitu 80,44%, dalam mendeteksi gejala penyakit Sumatra. Secara umum, sensor RGN memperlihatkan akurasi prediksi penyakit yang lebih tinggi dibandingkan sensor RGB, meskipun sensor RGB tetap kompetitif pada beberapa metode. Hasil ini menunjukkan bahwa pentingnya pemilihan metode analisis, sensor, dan indeks vegetasi yang sensitif untuk mengoptimalkan deteksi penyakit tanaman cengkih berbasis foto udara. Sensor RGN dengan indeks NDVI direkomendasikan untuk mendeteksi perubahan fisiologis tanaman, sementara sensor RGB tetap relevan dalam kondisi tujuan tertentu.

Kata kunci: *Ralstonia syzygii subsp. syzygii*, polymerase chain reaction, Unmanned aerial vehicle, NDVI, VARI

Abstract

Clove is one of Indonesia's leading commodities currently facing losses due to plant pests and diseases. Sumatra disease, caused by *Ralstonia syzygii* subsp. *syzygii*, is a major threat to the productivity of clove plants (*Syzygium aromaticum* L.). Early detection of Sumatra disease in clove plants is crucial to support integrated management and reduce production losses. This study compares the accuracy of disease detection using Red Green Blue (RGB) and Red Green Near Infrared (RGN) sensors based on vegetation indices from aerial photographs. The study was conducted by collecting ground truth data and aerial photos from 120 plant samples. The vegetation indices used include the visible atmospherically resistant index (VARI) and the normalized difference vegetation index (NDVI). Data analysis involved visual assessment, simple linear regression, multiple linear regression, random forest regression, and manual thresholding, with accuracy evaluated using confusion matrix and absolute percentage error (APE). Results show that multiple linear regression prediction with Box-Cox data transformation on the RGN sensor yielded the highest accuracy of 80.44% in detecting Sumatra disease symptoms. Overall, the RGN sensor demonstrated higher disease prediction accuracy compared to the RGB sensor, although the RGB sensor remained competitive in some methods. These findings highlight the importance of selecting appropriate analysis methods, sensors, and sensitive vegetation indices to optimize aerial photo-based detection of clove plant diseases. The RGN sensor with NDVI index is recommended for detecting physiological changes in plants, while the RGB sensor remains relevant under certain objective conditions.

Keywords: *Ralstonia syzygii* subsp. *syzygii*, polymerase chain reaction, Unmanned aerial vehicle, NDVI, VARI