INCIDENCE AND DISTRIBUTION OF TRISTEZA AND HUANGLONGBING DISEASES IN GREATER MALANG, EAST JAVA PROVINCE

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Bogor, August 2026

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ABSTRAK

RAFIDAH AMALI. Insidensi dan Distribusi Penyakit Tristeza dan Huanglongbing di Malang Raya, Provinsi Jawa Timur. Dibimbing oleh SARI NURULITA dan OTTO ENDARTO.

Salah satu kendala dalam produksi jeruk di Indonesia adalah adanya serangan penyakit tristeza dan huanglongbing (HLB). Tristeza disebabkan oleh citrus tristeza virus (CTV), sedangkan HLB disebabkan *Candidatus* Liberibacter asiaticus (*C*Las). Penelitian ini bertujuan mendeteksi serta mengetahui penyebaran CTV dan *C*Las pada perkebunan jeruk di Malang. Survei dilakukan di delapan kebun jeruk di Malang Raya dengan mengamati intensitas penyakit dan pengambilan sampel daun jeruk siam, manis, keprok yang tidak bergejala serta bergejala. Penghitungan insidensi dan intensitas CTV di lapangan dilakukan dengan skoring dan dikorelasikan dengan hasil deteksi awal *double antibody sandwich enzyme-linked immunosorbent assay* (DAS-ELISA) serta pengukuran klorofil. Sampel dengan berbagai variasi gejala dideteksi dan dikarakterisasi dengan *reverse transcription polymerase chain* reaction (RT-PCR) untuk CTV dan PCR untuk *C*Las serta dilanjutkan dengan Sanger sequencing. Sebaran penyakit berdasarkan hasil deteksi dipetakan dengan *Geographic Information System* (GIS). Insidensi penyakit di lapangan berkisar 48% hingga 96%, sedangkan severitas 13% hingga 59,5% dengan pola menyebar. Gejala vein clearing menunjukkan kandungan klorofil tertinggi, nilai absorbansi tinggi, tetapi severitas rendah, sedangkan gejala yellow vein menunjukkan kandungan klorofil terendah dengan nilai absorbansi dan severitas tinggi. Deteksi molekuler menunjukkan enam dari tujuh gejala positif CTV dan tiga gejala positif *C*Las, dengan infeksi campuran pada green vein, yellow vein, dan vein corking. Isolat CTV berkerabat dekat (99%) dengan isolat CTV asal Cuba dan *C*Las memiliki kemiripan tertinggi (100%) dengan isolat asal Indonesia dan Iran. Penelitian ini memberikan informasi insidensi dan distribusi CTV dan *C*Las pada perkebunan jeruk di Malang.

Kata kunci: *C*Las, DAS-ELISA, GIS, RT-PCR, spatial

ABSTRACT

RAFIDAH AMALI. Incidence and Distribution of Tristeza and Huanglongbing Diseases in Greater Malang, East Java Province. Supervised by SARI NURULITA and OTTO ENDARTO.

One of the major limiting factors in citrus production in Indonesia is infection by tristeza and huanglongbing (HLB) diseases. Tristeza is caused by citrus tristeza virus (CTV), whereas HLB is caused by *Candidatus* Liberibacter asiaticus (*C*Las). This study aimed to detect and determine the distribution of CTV and *C*Las in citrus orchards in Malang. A survey was conducted in eight citrus orchards in Greater Malang Rby assessing disease incidence and collecting leaf samples from Siam, manis, and keprok citrus trees, both symptomatic and asymptomatic. Disease incidence and severity of CTV in the field were evaluated using a scoring method and correlated with the results of initial detection using *double antibody sandwich enzyme-linked immunosorbent assay* (DAS-ELISA) and chlorophyll measurements. Samples exhibiting various symptoms were detected and characterized using *reverse transcription polymerase chain reaction* (RT-PCR) for CTV and PCR for *C*Las, followed by Sanger sequencing. Disease distribution based on detection results was mapped using a *Geographic Information System* (GIS). Disease incidence ranged from 48% to 96%, while disease severity ranged from 13% to 59.5%, showing a scattered distribution pattern. Vein clearing symptom exhibited the highest chlorophyll content and absorbance values but low disease severity, whereas yellow vein symptoms showed the lowest chlorophyll content and high absorbance and severity values. Molecular detection revealed that six of seven symptoms were positive for CTV and three were positive for *C*Las, with mixed infections detected in green vein, yellow vein, and vein corking symptoms. The CTV isolates were closely related (99%) to a CTV isolate from Cuba, while the *C*Las isolates showed the highest similarity (100%) to isolates from Indonesia and Iran. This study provides incidence information and distribution patterns of CTV and *C*Las in citrus orchards in Malang.

Keywords: *C*Las, DAS-ELISA, GIS, RT-PCR, spatial

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PREFACE

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The author hopes that this scientific work will be beneficial to those who may find it useful and contribute to the advancement of scientific knowledge.

Bogor, August 2026

Rafidah Amali

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