

DETECTION AND IDENTIFICATION OF CITRUS TRISTEZA VIRUS AND *CANDIDATUS LIBERIBACTER ASIATICUS* INFECTING CITRUS IN MALANG REGENCY, EAST JAVA

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**DEPARTMENT OF PLANT PROTECTION
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ABSTRAK

SITI NURMALASARI SUPARMAN. Deteksi dan Identifikasi Citrus tristeza virus dan *Candidatus Liberibacter asiaticus* pada Tanaman Jeruk di Kabupaten Malang, Jawa Timur. Dibimbing oleh SARI NURULITA dan SRI HENDRASTUTI HIDAYAT.

Penyakit tristeza dan *huanglongbing* (HLB) merupakan penyakit penting pada tanaman jeruk. Tristeza diakibatkan oleh infeksi citrus tristeza virus (CTV), sedangkan HLB disebabkan oleh *Candidatus Liberibacter asiaticus* (CLas). Keduanya menginfeksi jaringan floem, menyebabkan gejala klorosis pada daun serta menghambat pertumbuhan tanaman. Penelitian ini bertujuan untuk mendeteksi dan mengidentifikasi CTV dan CLas pada tanaman jeruk di Kabupaten Malang, Jawa Timur. Pengamatan lapangan dilakukan pada sembilan kebun jeruk untuk penilaian intensitas penyakit di lapangan. Pengambilan sampel daun jeruk berdasarkan variasi gejala per lokasi digunakan untuk deteksi lebih lanjut di Laboratorium Virologi Tumbuhan, IPB. Metode deteksi yang digunakan adalah metode *double antibody sandwich enzyme-linked immunosorbent assay* (DAS-ELISA) dan *reverse transcription-polymerase chain reaction* (RT-PCR) untuk CTV dan PCR untuk CLas. Analisis sekuen nukleotida dilakukan dengan aplikasi MEGA X dan BLAST NCBI. Insidensi klorosis berkisar antara 28% - 100% dengan severitas 32,7% - 70%. Tiga variasi gejala yang ditemukan meliputi (i) tulang daun menguning, (ii) klorosis lamina dan penebalan daun, serta (iii) klorosis disertai perubahan bentuk daun yang seluruhnya terdeteksi positif CTV dan CLas. Seluruh kebun positif terinfeksi CLas, sedangkan infeksi CTV tidak ditemukan pada satu kebun, yaitu Kebun Junrejo. Isolat CTV, yaitu KK, KUS, dan KUD memiliki tingkat homologi 99% terhadap isolat Indonesia (LC804809.1 dan LC834217.1), sedangkan isolat KAG CTV memiliki tingkat kesamaan 99% dengan isolat Indonesia, Uruguay, dan China (LC834223.1, KU928174.1, dan MW169346.1) dengan primer yang digunakan mengamplifikasi gen p23. Sementara itu, hasil analisis homologi isolat CLas menunjukkan kesamaan identitas 100% dengan isolat pembandingan karena primer yang digunakan mengamplifikasi region 16S rRNA yang bersifat konservatif. Penelitian ini menyajikan penggunaan deteksi molekuler dan pembaruan data infeksi CTV dan CLas pada pertanaman jeruk di Kabupaten Malang, Provinsi Jawa Timur.

Kata kunci: DAS-ELISA, gen p23, huanglongbing, RT-PCR, 16S rRNA

ABSTRACT

SITI NURMALASARI SUPARMAN. Detection and Identification of Citrus tristeza virus and *Candidatus Liberibacter asiaticus* Infecting Citrus in Malang Regency, East Java. Supervised by SARI NURULITA and SRI HENDRASTUTI HIDAYAT.

Tristeza and huanglongbing (HLB) are significant diseases affecting citrus. Tristeza is caused by citrus tristeza virus (CTV), while HLB is caused by *Candidatus Liberibacter asiaticus* (CLas). Both pathogens are phloem-limited, causing chlorosis on the leaves and inhibiting plant growth. This study aims to detect and identify CTV and CLas infecting citrus in Malang Regency, East Java. Field observations were conducted in nine citrus orchards to assess disease intensity in the field. Samples were collected on various symptoms per location for further detection at the Plant Virology Laboratory, IPB. Double-antibody sandwich enzyme-linked immunosorbent assay (DAS-ELISA) and reverse transcription polymerase chain reaction (RT-PCR) were used for CTV detection, and PCR for CLas. Nucleotide sequence analysis was performed using the MEGA X software and the BLAST program. Disease incidence ranged from 28% to 100%, with severity ranging from 32.7% to 70%. Three symptom types were observed, including vein yellowing, lamina chlorosis with leaf thickening, and leaf malformation with chlorosis, all of which tested positive for CTV and CLas. All tested samples from nine orchards were confirmed to be infected with CLas, whereas CTV was not detected in the sample from Junrejo Orchard. Three isolates of CTV (KK, KUS, and KUD) shared 99% identity with Indonesian CTV isolates (LC804809.1 and LC834217.1), meanwhile, isolate KAG had 99% sequence identity with Indonesian, Uruguay, and Chinese isolates (LC834223.1, KU928174.1, and MW169346.1), respectively, according to the p23 gene. Nucleotide sequence analysis of CLas isolates shared 100% identity with all compared isolates, as the primer covers the conserved 16S rRNA region. This study presents the use of molecular detection and provides updated information on the occurrence of CTV and CLas infecting citrus in Malang Regency, East Java Province.

Keywords: DAS-ELISA, gene P23, huanglongbing, RT-PCR, 16S rRNA



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at the
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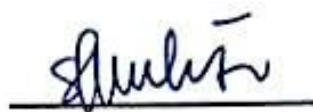
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PREFACE

All praise and gratitude are devoted to Allah Subhanahu wa Ta'ala for His endless blessings and grace, through which this scientific work has been successfully completed. This research focused on epidemiology of plant pathogens under the title “Detection and Identification of Citrus tristeza virus and *Candidatus Liberibacter asiaticus* on Citrus Plants in Malang Regency, East Java”.

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May this final project be beneficial to those who need it and contribute to the advancement of scientific knowledge.

Bogor, December 2025

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