

KARAKTERISASI MOLEKULER *Begomovirus* PADA TANAMAN CABAI (*Capsicum frutescens L.*) DI DESA PANDOWOHARJO, SLEMAN, YOGYAKARTA

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INTISARI

Begomovirus menjadi salah satu penyebab penurunan hasil produksi tanaman cabai karena menyebabkan penyakit keriting kuning. Virus ini sering berasosiasi dengan betasatelit yaitu bagian DNA tambahan yang dapat mempengaruhi tingkat virulensi dan patogenitasnya. Penelitian ini bertujuan untuk mengidentifikasi karakteristik molekuler *Begomovirus* dan mendeteksi keberadaan betasatelit yang mungkin berasosiasi dengan infeksi virus tersebut. Sampel diambil di Desa Pandowoharjo, Kecamatan Sleman, Yogyakarta berdasarkan skoring tingkat keparahan penyakit tanaman dari tanaman sehat hingga sakit. DNA total dari sampel daun tanaman cabai yang menunjukkan gejala penyakit diisolasi menggunakan teknik *potassium phosphate buffer* (PPB) dan diuji menggunakan teknik PCR dengan primer spesifik untuk mendeteksi fragmen genom *Begomovirus* dan betasatelit. Analisis filogenetik hasil sekuens dilakukan menggunakan program MEGA X dengan model substitusi *Kimura-2-parameter*, dan algoritma *Neighbor-Joining*. Nilai *bootstrap* dihitung 1000 ulangan replikasi dan diedit secara manual. Hasil sekuensing dan analisis filogenetik menunjukkan bahwa *Begomovirus* Sleman berdasarkan primer SPG1/SPG2 memiliki kemiripan nukleotida >91% dengan PepYLCIV Sumatera Utara dan Bogor. Sementara itu, *Begomovirus* Sleman berdasarkan primer PAL1v1978/PAR1c715 juga memiliki tingkat similaritas >91% terhadap spesies PepYLCIV Indonesia isolat Bali dan Jawa. Nilai jarak genetik antar isolat bervariasi dengan kisaran 3,78% hingga 19,02% berdasarkan primer SPG1/SPG2, serta berkisar antara 6,36% hingga 12,08% berdasarkan primer PAL1v1978/PAR1c715. Deteksi betasatelit terdeteksi pada sampel 2. Analisis filogenetik menunjukkan kekerabatan dekat dengan PepYLCV isolat Tanah Datar, yang mengindikasikan hubungan secara evolusioner dan berperan dalam memperparah infeksi virus. Hasil penelitian dapat menjadi dasar bagi pengembangan strategi pengendalian yang lebih efektif dalam mitigasi penyakit keriting kuning pada tanaman cabai.

KATA KUNCI: *Begomovirus*, betasatelit, cabai, PCR, sekuensing

MOLECULAR CHARACTERIZATION OF *Begomovirus* INFECTING CHILI PLANTS (*Capsicum frutescens* L.) IN PANDOWOHARJO VILLAGE, SLEMAN, YOGYAKARTA

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ABSTRACT

Begomovirus is one of the major causes of yield reduction in chili (*Capsicum annum* L.) production as it induces yellow leaf curl disease. This virus is often associated with betasatellites, additional DNA components that can influence its virulence and pathogenicity. This study aimed to identify the molecular characteristics of *Begomovirus* and to detect the presence of betasatellites potentially associated with viral infection. Samples were collected from Pandowoharjo Village, Sleman District, Yogyakarta, based on disease severity scoring ranging from healthy to severely infected plants. Total DNA from symptomatic chili leaf samples was isolated using the potassium phosphate buffer (PPB) method and tested using PCR with specific primers to amplify *Begomovirus* genomic fragments and betasatellites. Phylogenetic analysis of sequencing results was conducted using MEGA X software with the Kimura-2-parameter substitution model and the Neighbor-Joining algorithm. Bootstrap values were calculated with 1000 replications and manually edited. Sequencing and phylogenetic analyses revealed that *Begomovirus* Sleman, based on SPG1/SPG2 primers, shared more than 91% nucleotide similarity with PepYLCIV isolates from North Sumatra and Bogor. Meanwhile, *Begomovirus* Sleman based on PAL1v1978/PAR1c715 primers also exhibited >91% similarity with PepYLCIV isolates from Bali and Java. Genetic distance among isolates ranged from 3.78% to 19.02% (SPG1/SPG2) and 6.36% to 12.08% (PAL1v1978/PAR1c715). Betasatellite detection was confirmed in sample 2. Phylogenetic analysis indicated a close relationship with PepYLCV isolate Tanah Datar, suggesting an evolutionary connection and a role in aggravating viral infection. These findings may serve as a foundation for developing more effective control strategies in mitigating yellow leaf curl disease in chili plants.

KEYWORDS: *Begomovirus*, betasatellite, chili, PCR, sequencing