

**Mutasi Genetik *Pepper yellow leaf curl Indonesia virus*  
Penyebab Penyakit Kuning-Keriting Daun Tanaman  
Cabai Rawit (*Capsicum frutescens* L.)**

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INTISARI

Penyakit kuning keriting daun yang menginfeksi tanaman cabai rawit (*Capsicum frutescens* L.) disebabkan oleh *Pepper yellow leaf curl Indonesia virus* (PepYLCIV). Infeksi virus mengakibatkan daun mengecil, menguning (klorosis), serta helai daun menjadi keriting. Tanaman menjadi kerdil dan mengalami kerontokan bunga. Gen *AVI* berperan dalam mengkode *coat protein*. Gen *AC1/Rep* mengkode protein yang berperan dalam replikasi virus. Penelitian ini bertujuan untuk mendeteksi mutasi gen *AVI* (*Coat Protein*) dan *AC1/Rep* pada virus *wild type* dan *mild strain* yang ditemukan di lapangan. Sampel tanaman cabai rawit terinfeksi PepYLCIV didapatkan di area persawahan Umbulmartani, Sleman, Yogyakarta. Identifikasi virus awal dilakukan di lapangan dengan mengamati gejala yang muncul pada tanaman cabai rawit. Identifikasi virus secara molekular menggunakan primer universal Begomovirus (PALIc1960/PARIv722) dilakukan di Laboratorium Genetika dan Pemuliaan Fakultas Biologi UGM. *Sequencing* gen *AVI* dan *AC1/Rep* metode Sanger untuk mendeteksi adanya mutasi dilakukan di FirstBase Malaysia. Hasil penelitian menunjukkan bahwa terdapat 10 mutasi *silent* dan satu mutasi *missense* pada gen *AVI*. Mutasi ini menyebabkan valin ditranslasikan menjadi alanin. Gen *AC1/Rep* ditemukan 4 mutasi *silent* dan dua mutasi *missense* dalam satu kodon yang sama, menyebabkan valin ditranslasikan menjadi alanin. Berdasarkan *ENC-Plot Analysis* tiga *query* sekuens DNA virus, kedua sampel sekuens virus gen *AVI mild* (2 *query*) memiliki *codon usage* yang dipengaruhi oleh tekanan mutasi. Hanya *query 5* (*wild type*) saja yang memiliki *codon usage* akibat seleksi alam. *ENC-Plot Analysis* kedua sampel sekuens virus gen *AC1/Rep wild type* dan *mild* (2 *query*) memiliki *codon usage* yang dipengaruhi oleh tekanan mutasi.

Kata kunci : *Capsicum frutescens* L., *ENC-Plot analysis*, *mutation*, *sequencing*, PepYLCIV

**Genetic Mutation of *Pepper yellow leaf curl In*  
*Genetic Mutation of Pepper yellow leaf curl Indonesia virus*  
that Causes Yellow Leaf Curl Disease in Cayenne  
Pepper (*Capsicum frutescens* L.)**

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ABSTRACT

Yellow leaf curl disease which infects the cayenne pepper (*Capsicum frutescens* L.) plant is caused by the *Pepper yellow leaf curl Indonesia virus* (PepYLCIV). Viral infections cause the leaves to shrink, turn yellow (chlorosis), and become curly. Plants become stunted and experience flower loss. The AV1 gene plays a role in coding the coat protein. The AC1/Rep gene encodes a protein that plays a role in viral replication. This study was aimed to detect AV1 and AC1/Rep gene mutations in wild type and mild strain viruses found in the plantation area. Samples of cayenne pepper infected with PepYLCIV were obtained from Umbulmartani plantation area, Sleman, Yogyakarta. Early virus identification was carried out in the field by observing the symptoms that appear in cayenne pepper plants. Molecular identification of viruses using the Begomovirus universal primer (PALc1960 / PARIv722) was conducted at the Genetic and Breeding Laboratory of the Faculty of Biology UGM. Sanger sequencing method for detecting AV1 and AC1/Rep gene mutations was carried out in FirstBase Malaysia. The results showed that there were 10 silent mutations and one missense mutation in the AV1 gene, causing valine to be translated into alanine. In the AC1/Rep gene, 4 silent mutations and two missense mutations were found in the same codon, causing valine to be translated into alanine. Based on the ENC-Plot Analysis of three viral DNA sequence queries, both AV1 mild (2 queries) gene virus sequences have codon usage which is affected by pressure mutation. Only query 5 (wild type) has codon usage due to natural selection. ENC-Plot Analysis of the two AC1/Rep wild type gene virus sequence samples and mild (2 queries) gene virus sequences have codon usage which is influenced by pressure mutation.

Keywords : *Capsicum frutescens* L., ENC-Plot analysis, mutation, sequencing, PepYLCIV