Aplikasi Penanda Molekuler Sequence Characterized Amplified Region dan Respon Ketahanan Berbagai
Varietas Cabai (Capsicum spp.) Terhadap Nematoda Puru Akar
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APLIKASI PENANDA MOLEKULER *SEQUENCE CHARACTERIZED AMPLIFIED REGION* DAN RESPON KETAHANAN BERBAGAI VARIETAS CABAI (*Capsicum* spp.) TERHADAP NEMATODA PURU AKAR

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INTISARI

Cabai (*Capsicum* spp.) merupakan salah satu komoditas hortikultura yang banyak dibudidayakan dan memiliki permintaan pasar yang tinggi. Terdapat tantangan dalam budidaya cabai, khususnya serangan patogen nematoda puru akar (*Meloidogyne* spp.) yang termasuk endoparasit obligat dan dapat menyebabkan penurunan produktivitas cabai secara signifikan. Salah satu upaya pencegahan efektif dalam menangani infeksi nematoda ini yaitu dengan menggunakan tanaman inang yang memiliki gen ketahanan. Penelitian ini bertujuan untuk mengetahui tingkat ketahanan berbagai varietas cabai (*Capsicum* spp.) terhadap nematoda puru akar berdasarkan penanda molekuler SCAR dan penilaian *gall index*, serta menganalisis gejala fisiologis dan respon morfologis tanaman akibat infeksi nematoda puru akar. Adanya gen ketahanan pada 16 varietas cabai dianalisis menggunakan penanda molekuler SCAR dan 6 diantaranya dilakukan penilaian *gall index*. Gejala fisiologis yang diamati berupa kesegaran tanaman dan perubahan warna daun, serta dilakukan pengukuran respon morfologis yang meliputi tinggi tanaman (cm), panjang daun (cm), lebar daun (cm), jumlah buah, dan berat segar akar (g). Gen ketahanan terhadap nematoda puru akar ditemukan pada 5 varietas cabai yang ditunjukkan dengan *band* DNA berukuran $\pm$ 107 bp. Sementara itu, penilaian *gall index* mengelompokkan 6 varietas cabai ke dalam 4 kategori, yaitu *highly resistant*, *moderately resistant*, *moderately susceptible*, dan *highly susceptible*. Perlakuan P2 (inokulasi nematoda) memiliki pengaruh yang signifikan terhadap P1 (kontrol) dan tanaman rentan memberikan dampak yang lebih besar daripada kelompok tanaman resisten seperti penurunan tinggi tanaman 64,85%, penurunan panjang daun 40,3%, penurunan lebar daun 31,77%, penurunan produktivitas buah 78,56%, penurunan berat segar akar 71,24%, penurunan kesegaran tanaman, dan perubahan warna daun.

Kata Kunci : *gall index*, gen *Me*, *Meloidogyne* spp., PCR, SCAR

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APPLICATION OF SEQUENCE CHARACTERIZED AMPLIFIED REGION MARKERS AND RESISTANCE RESPONSES OF VARIOUS PEPPER VARIETIES (*Capsicum* spp.) TO ROOT-KNOT NEMATODES

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ABSTRACT

Peppers (*Capsicum* spp.) is one of the main horticultural commodities that is widely cultivated and has high market demand. However, pepper cultivation faces several challenges, particularly infections caused by root-knot nematodes (*Meloidogyne* spp.), which are obligate endoparasites capable of significantly reducing pepper productivity. One of the most effective preventive strategies for managing nematode infection is the use of host plants carrying resistance genes. This study aimed to determine the resistance levels of various pepper (*Capsicum* spp.) varieties against root-knot nematodes based on SCAR molecular markers and gall index assessment, as well as to analyze the physiological symptoms and morphological responses of plants following nematodes infection. The presence of resistance genes in 16 peppers varieties was analyzed using SCAR molecular markers, and 6 varieties were further evaluated using gall index assessment. The physiological symptoms observed included plant vigor and leaf color changes, while the morphological responses measured comprised plant height (cm), leaf length (cm), leaf width (cm), number of fruits, and fresh root weight (g). Resistance genes against root-knot nematodes were identified in 5 pepper varieties, indicated by the presence of a DNA band of ±107 bp. Meanwhile, gall index assessment classified the 6 pepper varieties into 4 categories, highly resistant, moderately resistant, moderately susceptible, and highly susceptible. Treatment P2 (nematode inoculation) showed a significant effect compared to P1 (control), and susceptible plants exhibited greater adverse impacts than resistant plants, including reductions in plant height 64,85%, leaf length 40,3%, leaf width 31,77%, fruit productivity 78,56%, fresh root weight 71,24%, plant vigor, and leaf color quality.

Keywords: gall index, *Me* genes, *Meloidogyne* spp., PCR, SCAR