PRIMERS EVALUATION FOR DETECTION OF POTYVIRUSES USING RT-PCR TECHNIQUE

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ABSTRAK

ROSNAWATI RAKHMAN. Evaluasi Beberapa Primer untuk Deteksi Potyvirus dengan Teknik RT-PCR. Dibimbing oleh SRI HENDRASTUTI HIDAYAT dan SARI NURULITA.

Deteksi dan identifikasi menggunakan *polymerase chain reaction* (PCR) merupakan langkah diagnosis awal untuk menentukan virus sebagai agen penyebab penyakit tanaman. Diagnosis dini penting untuk mencegah dan mengurangi kehilangan hasil pada tanaman bernilai ekonomi. Primer merupakan komponen yang menentukan keberhasilan teknik PCR. Penelitian ini membandingkan sensitivitas dan spesifitas primer spesifik spesies dan primer universal genus untuk mendeteksi beberapa spesies potyvirus menggunakan teknik *reverse transcription* (RT)-PCR. Sampel uji terdiri atas beberapa tanaman yang menunjukkan gejala mosaik, malformasi daun, dan penebalan atau pemucatan tulang daun. Deteksi dilakukan dengan *one-step* RT-PCR menggunakan pasangan primer spesifik PRSV-326/PRSV-800, P-RT3/P-RT4, OG-RT1/OG-RT2, ChiVMV F Ind/ChiVMV R Ind, dan PVY-cpF/PVY-cpR untuk masing-masing virus target *Papaya ringspot virus* (PRSV), *Leek yellow stripe virus* (LYSV), *Onion yellow dwarf virus* (OYDV), *Chilli veinal mottle virus* (ChiVMV), dan *Potato virus Y* (PVY). Primer universal potyvirus yang digunakan terdiri atas U341/Poty1 dan MJ1/MJ2. Terdapat perbedaan hasil amplifikasi menggunakan primer spesifik dan universal untuk sampel terinfeksi PRSV, LYSV, dan OYDV. Masing-masing primer spesifik berhasil mendeteksi virus target pada jumlah sampel yang lebih banyak dibandingkan dengan deteksi menggunakan primer universal. Sementara itu, deteksi ChiVMV dan PVY menggunakan primer spesifik memberikan hasil yang sama dengan deteksi primer universal. Primer universal U341/Poty1 dan MJ1/MJ2 memberikan hasil yang baik untuk deteksi potyvirus dari sampel lapangan, yaitu *Celery mosaic virus* (CeMV) dan *Yambean mosaic virus* (YBMV).

Kata kunci: malformasi, mosaik, penebalan tulang daun, primer spesifik, primer universal

ABSTRACT

ROSNAWATI RAKHMAN. Primers Evaluation for Detection of Potyviruses Using RT-PCR Technique. Supervised by SRI HENDRASTUTI HIDAYAT and SARI NURULITA.

Detection and identification using polymerase chain reaction (PCR) is an initial step to diagnose viruses as the causal agents of plant disease. Early diagnosis is important to prevent and reduce yield losses in economically valuable crops. Primers are crucial components that determine the success of PCR detection. This study compares the sensitivity and specificity of species-specific and genus-universal primers in detecting several potyviruses using the reverse transcription (RT)-PCR technique. The test samples consisted of various plants exhibiting symptoms such as mosaic, leaf malformation, and vein banding or vein clearing. Detection was performed using one-step RT-PCR with specific primer pairs PRSV-326/PRSV-800, P-RT3/P-RT4, OG-RT1/OG-RT2, ChiVMV F Ind/ChiVMV R Ind, and PVY-cpF/PVY-cpR for the respective target viruses *Papaya ringspot virus* (PRSV), *Leek yellow stripe virus* (LYSV), *Onion yellow dwarf virus* (OYDV), *Chilli veinal mottle virus* (ChiVMV), and *Potato virus Y* (PVY). The universal potyvirus primers used were U341/Poty1 and MJ1/MJ2. There were differences in amplification results when using specific and universal primers for samples infected with PRSV, LYSV, and OYDV. Each specific primer of PRSV, LYSV, and OYDV successfully detected the target virus in more samples compared to detection using universal primers. Meanwhile, detection of ChiVMV and PVY using specific primers yielded the same results as detection using universal primers. Additionally, the universal primers U341/Poty1 and MJ1/MJ2 provided good results for detecting potyviruses from the field samples, specifically *Celery mosaic virus* (CeMV) and *Yambean mosaic virus* (YBMV).

Keywords: malformation, mosaic, specific primer, universal primer, vein banding

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PREFACE

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The author hopes that this final project will be beneficial to readers and contribute to the broader scientific community.

Bogor, May 2025

Rosnawati Rakhman

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