DETECTION AND IDENTIFICATION OF THREE ALLEXIVIRUSES INFECTING *Allium* spp. USING REVERSE TRANSCRIPTION POLYMERASE CHAIN REACTION TECHNIQUE

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Bogor, August 2025

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ABSTRAK

AMANDA FEBRIYANTI NURDEVI. Deteksi dan Identifikasi Tiga Allexivirus yang Menginfeksi *Allium* spp. dengan Teknik *Reverse Transcription Polymerase Chain Reaction*. Dibimbing oleh SARI NURULITA dan DIDIET RAHAYU DIANA.

Bawang putih, bawang merah, dan bawang bombai merupakan komoditas hortikultura penting di Indonesia karena memiliki beragam kegunaan, baik dalam bidang kuliner maupun kesehatan. Perdagangan internasional pada komoditas bawang berdampak terhadap keberadaan penyakit baru, khususnya virus yang menginfeksi tanaman allium melalui umbi. Genus potyvirus, carlavirus, dan allexivirus merupakan kelompok virus utama yang menginfeksi tanaman allium di seluruh dunia. Namun, penelitian terkait allexivirus belum banyak dilakukan di Indonesia. Oleh karena itu, tujuan dari penelitian ini adalah mendeteksi kelompok allexivirus yang menginfeksi komoditas allium. Sampel bawang putih dan bawang merah lokal diperoleh dari beberapa sentra produksi di Indonesia, sedangkan sampel impor diperoleh dari Balai Besar Karantina Hewan Ikan dan Tumbuhan (BBKHIT) DKI Jakarta, serta dibeli dari pasar tradisional di Kota Bogor. Hasil uji RT-PCR spesifik berhasil mendeteksi tiga jenis allexivirus pada bawang putih, sementara tidak ditemukan sampel positif pada bawang merah maupun bawang bombai. Infeksi allexivirus lebih banyak ditemukan dalam infeksi campuran dibandingkan infeksi tunggal. Analisis pohon filogeni menunjukkan bahwa GarVA dari bawang putih impor berkelompok dalam satu klaster yang sama dengan Tiongkok (MN059252.1; MN059258.1; MN059282.1), begitu pula GarVB dari bawang putih impor yang berkerabat dekat dengan Tiongkok (MN059151.1). Isolat allexivirus dari sampel lokal menunjukkan variasi struktur genom dengan tingkat keragaman genetik yang tinggi. Penelitian ini memberikan informasi baru mengenai keberadaan tiga jenis allexivirus di Indonesia serta analisis risiko untuk mencegah penyebaran virus ini pada budi daya allium lokal.

Kata kunci: infeksi campuran, keragaman genetik, primer spesifik, sekuensing, virus bawang

ABSTRACT

AMANDA FEBRIYANTI NURDEVI. Detection and Identification of Three Allexiviruses Infecting *Allium* spp. using Reverse Transcription Polymerase Chain Reaction Technique. Supervised by SARI NURULITA and DIDIET RAHAYU DIANA.

Garlic, shallot, and onion are important horticultural commodities in Indonesia due to their diverse uses in both culinary and human health. International trade of these commodities has contributed to the emergence of new diseases, particularly viruses that infect allium plants through fresh bulbs. Potyvirus, carlavirus, and allexivirus are the main groups of viruses known to infect allium species worldwide. However, there has been limited investigation for Allexivirus in Indonesia. Therefore, the aim of this study was to detect allexivirus infecting allium. Local garlic and shallot samples were obtained from several production center in Indonesia, while imported samples were obtained from regional plant quarantine service (BBKHIT) DKI Jakarta and purchased from traditional market in Bogor City. Specific RT-PCR test was successfully detected three allexiviruses in garlic, while no positive sample detected in shallot and onion. Allexiviruses were found mostly in mixed infection than single infection. Further phylogenetic tree revealed that GarVA isolates from imported garlic were clustered in the same group with China (MN059252.1; MN059258.1; MN059282.1), as well as GarVB isolate from imported galic was grouped closely to Chinese isolate (MN059151.1). Allexivirus isolates from local samples have various genome structure with high genetic diversity. This study provides new information about the occurrence of three allexiviruses in Indonesia and risk analysis to prevent the spread of this virus in local allium cultivation.

Keywords: garlic virus, genetic diversity, mixed infection, sequencing, specific primer

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PREFACE

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The author hopes that this scientific work will contribute to the advancement of scientific knowledge.

Bogor, August 2025

Amanda Febriyanti Nurdevi

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