

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

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BOGOR
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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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AMANDA FEBRIYANTI NURDEVI

Undergraduate thesis
In partial fulfillment of the requirements for the degree of
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at the
Department of Plant Protection

**DEPARTMENT OF PLANT PROTECTION
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PREFACE

All praise and gratitude to Allah Subhanaahu wa Ta'ala for His infinite blessings and grace, so that this scientific work can be successfully completed. The research was conducted from December 2024 to April 2025, focused on the molecular detection of plant viruses, titled "Detection and Identification of Three Allexiviruses Infecting *Allium* spp. using Reverse Transcription Polymerase Chain Reaction Technique."

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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



TABLE OF CONTENTS

LIST OF TABLES	x
LIST OF FIGURES	x
LIST OF APPENDIXES	xi
INTRODUCTION	1
1.1 Background	1
1.2 Research Questions	2
1.3 Research Objectives	2
1.4 Research Outcomes	2
LITERATURE REVIEW	3
2.1 Distribution and Botany of Garlic	3
2.1.1 Distribution of Garlic in Indonesia	3
2.1.2 Agronomy of Local Garlic	3
2.1.3 Local Garlic Varieties	3
2.2 Distribution and Botany of Shallot	4
2.2.1 Shallot Distribution in Indonesia	4
2.2.2 Agronomy of Shallot	4
2.2.3 Local Shallot Varieties	4
2.3 Distribution and Botany of Onion	4
2.3.1 Distribution of Onion	4
2.3.2 Agronomy of Onion	5
2.4 Pest and Disease of Allium	5
2.5 Genus Allievirus	5
2.5.1 Taxonomy and Morphology	5
2.5.2 Biology	5
2.5.3 Geographical Distribution of Allievirus	6
2.6 Reverse Transcription Polymerase Chain Reaction (RT-PCR)	6
III MATERIALS AND METHOD	7
3.1 Location and Research Period	7
3.2 Work Procedures	7
3.2.1 Sample Collection	7
3.2.2 Bulb Germination	8
3.2.3 Virus Detection by RT-PCR	8
3.2.4 Nucleotide Sequence Analysis	9
IV RESULT AND DISCUSSION	10
4.1 Result	10
4.1.1 Morphological Character of Allium Bulbs	10
4.1.2 Virus Symptoms and Detection Result	12
4.1.3 Molecular Characteristics of Allievirus	14
4.2 Discussion	21
V CONCLUSION AND SUGGESTION	23
5.1 Conclusion	23
5.2 Suggestion	23

REFERENCES	24
APPENDIXES	31
BIOGRAPHY	38

REFERENCES	24
APPENDIXES	31
BIOGRAPHY	38

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LIST OF TABLES

1	List of sample types and origin	7
2	Specific primers for allexivirus detection	9
3	Average bulb diameter of garlic, shallot, and onion (mm)	12
4	Detection results for allexivirus infecting allium	14
5	Genetic diversity analysis of Garlic virus A and Garlic virus B infecting garlic	17
6	Population structure analysis (Fst) of Garlic virus A	18
7	Population structure analysis (Fst) of Garlic virus B	18

LIST OF FIGURES

1	Comparison of garlic bulbs based on stem neck type. A, softneck type in consumption bulbs; B, hardneck type in seed bulbs of 'Tawangmangu Baru' variety.	10
2	Comparison of consumption and seed bulbs; A, based on bulb shape and size; B, based on clove size and colour; (1), consumption bulbs from China; (2), seed bulbs of 'Tawangmangu Baru' variety.	10
3	Comparison of shallot 'Bima' and 'Tajuk' variety. A, 'Bima' variety; B, 'Tajuk' variety.	11
4	Imported onion bulbs. A, cut longitudinally; B, cut transversely.	11
5	Symptom variations of virus-infected garlic. A, yellow stripes on the leaf; B, leaf mosaic C, leaf malformation; D, leaf twisted. Each symptom was indicated by yellow arrow.	12
6	Symptom variations of shallot and onion. A and B, shallot; C and D, onion. A, leaf mosaic; B, stunted plant; C, leaf mosaic; D, yellowing at the tip. Each symptom was indicated by yellow arrow.	12
7	Visualization of DNA amplification. GarVA (A), GarVB (B), and GarVE (C) isolates in garlic. M, GeneRuler 100 bp DNA Ladder (Thermo-Fisher Scientific, US); k+, positive control; k-, negative control; samples from several locations and varieties: 1, LK; 2, LH-1; 3, LH-2; 4, LH-3; 5, SS; 6, TB-1; 7, TB-2; 8, CW; 9, CG-1; 10, CG-2; 11, CG-3.	13
8	Sequence demarcation tool (SDT) matrix of Garlic virus A (GarVA) isolates based on pairwise sequence comparison. Garlic virus C (GarVC) isolate used an outgroup. Sequences generated in this study were highlighted with red font.	14
9	Sequence demarcation tool (SDT) matrix of Garlic virus B (GarVB) isolates based on pairwise sequence comparison. Garlic virus A (GarVA) isolate used as an outgroup. Sequences generated in this study were highlighted with red font.	15
10	Sequence demarcation tool (SDT) matrix of Garlic virus E (GarVE) isolates based on pairwise sequence comparison. Garlic virus B (GarVB) isolate used as an outgroup. Sequences generated in this study were highlighted with red font.	15

11	Phylogenetic tree based on nucleotide sequences showing the relationship of three different allexiviruses isolates, Garlic virus A (GarVA), Garlic virus B (GarVB), and Garlic virus E (GarVE) identified in this study with selected allexivirus sequences in the GenBank. Isolates from this study were marked with black dot colour. Onion yellow dwarf virus (OYDV) was used as outgroup.	16
12	Haplotype network of Garlic virus A. The size of each circle represents the sample size in the haplotype. Each mutation is indicated by the hatch mark.	19
13	Haplotype network of Garlic virus B. The size of each circle represents the sample size in the haplotype. Each mutation is indicated by the hatch mark.	20

LIST OF APPENDIXES

1	Sequence homology value (%) of Garlic virus A	32
2	Sequence homology value (%) of Garlic virus B	33
3	Sequence homology value (%) of Garlic virus E	34
4	Tutorial on making haplotype network	35