

**EFFICACY OF SECONDARY METABOLITES FROM *Bacillus* sp. D28
AGAINST THE SEVERITY OF PURPLE BLOTCH DISEASE IN
SHALLOT PLANTS**

THESIS



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**AGROTECHNOLOGY STUDY PROGRAM
FACULTY OF AGRICULTURE
UNIVERSITY OF PEMBANGUNAN NASIONAL "VETERAN" EAST JAVA
SURABAYA
2026**

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Submitted to The Agrotechnology Department to Earn A Bachelor's Degree in
Agriculture



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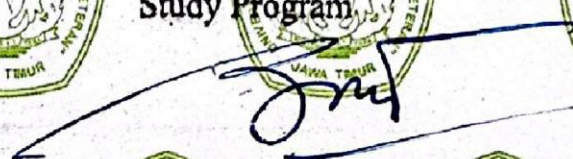

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Efficacy of Secondary Metabolites from *Bacillus* sp. D28 Against the Severity of Purple Blotch Disease in Shallot

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Abstract

Purple blotch disease caused by *Alternaria porri* is a major constraint in shallot production and can significantly reduce plant productivity. This study aimed to identify the secondary metabolites produced by *Bacillus* sp. D28 using gas chromatography–mass spectrometry (GC-MS) and evaluate their efficacy in suppressing purple blotch disease and promoting shallot growth. An in vivo experiment was conducted under greenhouse conditions using a Completely Randomized Design with five treatments, namely untreated control, secondary metabolite concentrations of 20%, 30%, and 40%, and mancozeb at 0.40%. Each treatment consisted of five replications with four plants per replication. The observed parameters included disease incubation period, disease intensity, plant height, number of leaves, and control efficacy. The application of secondary metabolites delayed symptom development and reduced disease intensity. The 40% treatment reduced disease intensity to 20.00% compared with 65.00% in the control, resulting in 69.23% control efficacy. It also increased plant height by approximately 59.96% compared with the control at 35 days after planting. Based on the calculated efficacy ratio, the 40% treatment showed 100% relative efficacy equivalence to mancozeb. These results indicate the potential of *Bacillus* sp. D28 secondary metabolites as an environmentally friendly alternative for purple blotch disease management in shallot production.

Keywords: *Alternaria porri*, *Bacillus* sp., shallots, GC-MS, secondary metabolites, purple blotch

FOREWORD

Praise and thanks be to Allah SWT for all His mercy and blessings, which have enabled the author to complete this thesis titled “Efficacy of Secondary Metabolites from *Bacillus* sp. D28 on the Severity of Purple Blotch Disease in Shallot Plants.” The purpose of this thesis is to fulfill a mandatory requirement for obtaining a bachelor’s degree in the Agrotechnology Program, Faculty of Agriculture, University Pembangunan Nasional “Veteran” East Java. The successful completion of this thesis would not have been possible without the guidance and encouragement from various parties; therefore, with all humility, the author would like to express gratitude to:

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TABLE OF CONTENTS

	Page
FOREWORD	ii
TABLE OF CONTENTS	iii
LIST OF TABLES.....	v
LIST OF FIGURES.....	vi
I. INTRODUCTION	1
1.1. Background	1
1.2. Research Questions	4
1.3. Research Objectives	4
1.4. Benefits of the Research	4
II. LITERATURE REVIEW	6
2.1. Conditions and Production of Shallot in Indonesia	6
2.2. <i>Alternaria porri</i> and Infection Mechanism.....	8
2.3. Purple Blotch Disease in Shallot.....	11
2.4. The Bacterium <i>Bacillus</i> sp. D28 as a Biocontrol Agent	12
2.5. The Role of Lipopeptide Secondary Metabolites.....	15
2.6. Crude Extracts and Applications of Filosfer	17
2.7. Testing of Secondary Metabolite Compounds Using GC-MS....	19
2.8. <i>In Vivo</i> Testing of Secondary Metabolites	20
2.9. Hypothesis.....	21
III. RESEARCH METHODS	22
3.1. Location and Time	22
3.2. Equipment and Materials	22
3.3. Research Design.....	22
3.3.1. <i>In Vivo</i>	22
3.4. Research Implementation.....	23
3.4.1. Sterilization of Equipment and Materials	23
3.4.2. Preparation of <i>Potato Dextrose Agar</i> (PDA)	24
3.4.3. Preparation of <i>Nutrient Agar</i> (NA)	24

3.4.4. Preparation of <i>Nutrient Broth</i> (NB)	24
3.4.5. Preparation of <i>Alternaria porri</i> Isolate	24
3.4.6. Pathogenicity Testing of the Fungus <i>Alternaria porri</i>	25
3.4.7. Preparation of <i>Bacillus</i> sp.	25
3.4.8. Secondary Metabolites Production of <i>Bacillus</i> sp. D28 ...	25
3.4.9. Secondary Metabolites Analysis Using GC-MS.....	26
3.4.10. Secondary Metabolites Testing on Disease Severity	26
3.5. Research Parameters	27
3.5.1. Incubation Period	27
3.5.2. Disease Severity.....	28
3.5.3. Shallot Plant Growth.....	29
3.6. Data Analysis	30
IV. RESULTS AND DISCUSSION	31
4.1. Characteristics of the Pathogen <i>Alternaria porri</i>	31
4.1.1. Macroscopic and Microscopic Characteristics of <i>A. porri</i>	31
4.1.2. Pathogenicity of <i>A. porri</i> on Shallot Plants.....	32
4.2. Characteristics of <i>Bacillus</i> sp. D28	33
4.3. Compounds of <i>Bacillus</i> sp. D28 Based on GC-MS Analysis	34
4.4. Identification and Potential of Secondary Metabolites	37
4.5. Secondary Metabolites Effect on the Incubation Period.....	39
4.6. <i>In Vivo</i>	41
4.6.1. Severity of Purple Blotch Disease	41
4.6.2. Treatments Effect on Plant Height	44
4.6.3. Treatments Effect on the Number of Leaves	46
4.7. Equivalence of Secondary Metabolites with Mancozeb	49
V. CONCLUSIONS AND RECOMMENDATIONS.....	53
5.1. Conclusions.....	53
5.2. Recommendations	53
REFERENCES.....	54
APPENDIX	64

LIST OF TABLES

Number	<u>Text</u>	Page
4.1.	Results of the Severity of Purple Blotch Disease	42
4.2.	Shallot Plants Height.....	44
4.3.	Number of Leaves on Shallot Plants.....	47
4.4.	Percentage of Equivalence to Mancozeb	50

Appendix

1.	ANOVA Test of Disease Severity at 8 DAI	91
2.	ANOVA Test for Disease Severity at 11 DAI.....	91
3.	ANOVA Test for Disease Severity at 14 DAI.....	91
4.	ANOVA Test for Disease Severity at 17 DAI.....	91
5.	ANOVA Test for Disease Severity at 20 DAI.....	92
6.	ANOVA Test for Plant Height at 14 DAP.....	92
7.	ANOVA Test for Plant Height at 21 DAP.....	92
8.	ANOVA Test for Plant Height at 28 DAP.....	92
9.	ANOVA Test for Plant Height at 35 DAP.....	93
10.	ANOVA Test for Number of Leaves at 14 DAP	93
11.	ANOVA Test for Number of Leaves at 21 DAP	93
12.	ANOVA Test for Number of Leaves at 28 DAP	93
13.	ANOVA Test for Number of Leaves at 35 DAP	94

LIST OF FIGURES

Number	<u>Text</u>	Page
2.1.	Graph of Shallot Production Results.....	6
2.2.	Shallot (<i>Allium cepa</i> L. var. <i>aggregatum</i>)	7
2.3.	Macroscopic and Microscopic Morphology of <i>A. porri</i>	9
2.4.	Symptoms of Purple Blotch Disease on Shallot	11
2.5.	Bacterial Isolates of <i>Bacillus</i> sp.	12
3.1.	<i>In vivo</i> Experimental Design.....	23
4.1.	Morphology of the Fungus <i>Alternaria porri</i>	31
4.2.	Pathogenicity Test on Shallot Plants.....	32
4.3.	Macroscopic Characteristics of <i>Bacillus</i> sp. D28	34
4.4.	Chromatogram of Secondary Metabolites of <i>Bacillus</i> sp. D28 ..	35
4.5.	Graph of Incubation Period for Purple Blotch Disease	40
4.6.	Severity of Purple Blotch Disease	41
 <u>Appendix</u>		
1.	In Vivo Research Site.....	62
2.	Pathogenicity Test	62
3.	Observation on the Severity of Purple Blotch Disease Outbreaks	62
4.	Secondary Metabolite Sample Extraction Process	62
5.	Calculation of Disease Severity at 8 DAI	63
6.	Calculation of Disease Severity at 11 DAI	68
7.	Calculation of Disease Severity at 14 DAI	73
8.	Calculation of Disease Severity at 17 DAI	78
9.	Calculation of Disease Severity at 20 DAI	83
10.	Efficacy Level Calculation	88
11.	Equivalence Level Calculation	89
12.	Pathogenicity Test Calculation.....	90