POTENTIAL OF SECONDARY METABOLITES OF ENDOPHYTIC BACTERIA *Bacillus* sp. BTH-22 AS AN ANTIFUNGAL AGENT AGAINST *Colletotrichum* sp. IN CHILI SEEDS (*Capsicum frutescens* L.)

THESIS

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AGROTECHNOLOGY STUDY PROGRAM
FACULTY OF AGRICULTURE
UNIVERSITAS PEMBANGUNAN NASIONAL "VETERAN" JAWA TIMUR
SURABAYA

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THESIS

Submitted to Fulfill the Requirements for
a Bachelor's Degree in Agriculture
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APPROVAL SHEET

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POTENSI METABOLIT SEKUNDER BAKTERI ENDOFIT *Bacillus* sp. BTH-22 SEBAGAI ANTIFUNGI *Colletotrichum* sp. PADA BENIH CABAI RAWIT (*Capsicum frutescens* L.)

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ABSTRAK

Cabai rawit (*Capsicum frutescens* L.) merupakan komoditas hortikultura yang memiliki nilai ekonomi yang tinggi. Salah satu kendala produksi cabai rawit yaitu adanya patogen terbawa benih cabai yang disebabkan oleh jamur *Colletrotichum* sp. Pengendalian alternatif yang dapat digunakan yaitu dengan memanfaatkan metabolit sekunder *Bacillus* sp.karena memiliki kemampuan untuk memproduksi metabolit sekunder yang dapat digunakan sebagai antifungi. Penelitian ini bertujuan untuk mengetahui kemampuan taraf konsentrasi metabolit sekunder *Bacillus* sp. Bth-22 yang efektif dalam menekan infeksi jamur *Colletotrichum* sp. pada benih cabai rawit, meningkatkan daya kecambah dan pertumbuhan tanaman cabai rawit menggunakan metode *blotter test* dan *growing on test*. Penelitian ini menggunakan rancangan acak lengkap (RAL) satu faktor berupa taraf konsentrasi (10%, 15%, 20%, 25% dan 30%), kontrol negatif (suspensi patogen) dan kontrol positif (fungisida kimia propineb). Hasil penelitian menunjukkan bahwa konsentrasi terbaik metabolit sekunder *Bacillus* sp. yaitu konsentrasi 30% yang mampu menekan tingkat infeksi jamur *Colletotrichum* sp. pada benih cabai sebesar 47.6% pada metode *blotter test* dan 91.6% pada metode growing on test. Selain itu, metabolit sekunder *Bacillus* sp. konsentrasi 30% juga mampu meningkatkan persentase daya kecambah sebesar 64% pada metode blotter test dan 94.3% pada metode *growing on test*. Metabolit sekunder *Bacillus* sp. konsentrasi 30% mampu meningkatkan pertumbuhan tinggi tanaman sebesar 133% terhadap kontrol negatif dan 7% terhadap kontrol positif dan mampu meningkatkan pertumbuhan panjang akar sebesar 140% terhadap kontrol negatif dan 13% terhadap kontrol positif.

Kata kunci: Benih cabai rawit, perlakuan benih, *Bacillus* sp., *Colletotrichum* sp., metabolit sekunder

ABSTRACT

Chili (Capsicum frutescens L.) is a horticultural commodity with high economic value. One of the major constraints in its production is seed-borne pathogens, particularly those caused by the fungus Colletotrichum sp. An alternative control strategy that can be applied is the utilization of secondary metabolites from Bacillus sp., as they possess the ability to produce antifungal compounds. This study aimed to determine the effective concentration levels of secondary metabolites of Bacillus sp. Bth-22 in suppressing Colletotrichum sp. infection on chili seeds, as well as to evaluate their effects on seed germination and

plant growth using blotter test and growing-on test methods. The experiment was arranged in a completely randomized design (CRD) with a single factor consisting of various concentrations (10%, 15%, 20%, 25%, and 30%), a negative control (pathogen suspension), and a positive control (chemical fungicide propineb). The results indicated that the optimal concentration of Bacillus sp. secondary metabolites was 30%, which suppressed Colletotrichum sp. infection on seeds by 47.6% in the blotter test and 91.6% in the growing-on test. Furthermore, the 30% concentration also enhanced germination by 64% in the blotter test and 94.3% in the growing-on test. In addition, the 30% concentration increased plant height by 133% compared to the negative control and 7% compared to the positive control, and improved root length by 140% compared to the negative control and 13% compared to the positive control.

***Keywords**: Chili seed, seed treatment, Bacillus sp., Colletotrichum sp., secondary metabolites*

PREFACE

Praise and gratitude are hereby rendered to Allah SWT, the Almighty, for all the knowledge, guidance, and strength bestowed upon the author, enabling the completion of this thesis entitled *"*Potential of Secondary Metabolites of Endophytic Bacteria *Bacillus* sp. Bth-22 as an Antifungal Agent Against *Colletotrichum* sp. on Chili Seeds (*Capsicum frutescens* L.)". This thesis is prepared as a partial fulfillment of the requirements for obtaining a Bachelor's degree (S1) in the Agrotechnology Study Program, Faculty of Agriculture, Universitas Pembangunan Nasional "Veteran" Jawa Timur.

The author acknowledges that this thesis is far from perfect; therefore, constructive criticism and suggestions are highly appreciated for its future improvement. It is hoped that this thesis can contribute to the advancement of knowledge, particularly in the field of plant pathology and the application of endophytic bacteria as a biological control agent.

Surabaya, September 2025

Writer

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