EFFICACY OF SEED SOAKING USING *Paenibacillus sp.* BACTERIA TO CONTROL *Xanthomonas sp.* LEAF BLIGHT DISEASE IN RICE PLANTS

THESIS

Written by:

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

2025

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THESIS

Submitted to Fulfilll the Requirements for Obtaining
a Bachelor of Agriculture Degree
in the Agrotechnology Study Program

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APPROVAL SHEET

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Submitted on:

12 August 2025

This thesis is accepted as one of the requirements for obtaining
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I declare that in this scientific document of the final project/thesis, there are no parts of other scientific works that have been submitted to obtain an academic degree at any higher education institution, and there are also no works or opinions that have been written or published by other individuals/institutions, except those that are cited in writing in this document and fully listed in the bibliography.

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EFFICACY OF SEED SOAKING USING *Paenibacillus sp.* BACTERIA TO CONTROL *Xanthomonas sp.* LEAF BLIGHT DISEASE IN RICE PLANTS

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ABSTRACT

The decline in rice productivity each year is partly caused by pathogens that infect rice seeds, namely the bacterium *Xanthomonas* oryzae, which causes bacterial leaf blight (BLB). One of the efforts undertaken is seed treatment before planting using environmentally friendly biological agents, specifically the application of *Paenibacillus* sp. bacteria. This study aims to determine the efficacy of seed soaking using *Paenibacillus* sp. bacteria in reducing disease intensity and enhancing rice plant growth. The research method used a completely randomized design (CRD) with four treatments: P0 = *Streptomycin* bactericide 0.2%, P1 = *Paenibacillus* sp. isolate, P2 = *Bacillus* BTH 22, P3 = *Paenibacillus polymyxa*, and five replications. The results showed that seed soaking treatment using *Paenibacillus* sp. bacteria at a dose of 20 ml/g was sufficiently effective in increasing germination rate by 91.25%, growth rate by 4.33%, and vigor index by 9.53% compared to *Bacillus* sp. BTH 22 and *Paenibacillus polymyxa* isolates. Additionally, seed soaking treatment using *Paenibacillus* sp. bacteria was able to extend the incubation period of *Xanthomonas* sp. bacteria for the longest duration of 3 HSI compared to the control treatment, with the lowest disease attack intensity of 10.21%, the highest efficacy rate of 53.32%, and the tallest plant height of 47.24 cm.

Keywords: Rice plants; seed soaking; *Paenibacillus* sp; *Xanthomonas* sp.

ABSTRAK

Penurunan produktivitas tanaman padi setiap tahun salah satunya disebabkan oleh patogen yang menginfeksi benih padi yaitu bakteri *Xanthomonas oryzae* yang menyebabkan penyakit hawar daun bakteri (HDB). Salah satu upaya yang dilakukan yaitu dengan perlakuan benih (*seed treatment*) sebelum tanam menggunakan agens hayati ramah lingkungan yaitu pemberian bakteri *Paenibacillus* sp. Penelitian ini bertujuan untuk mengetahui tingkat efikasi perendaman benih menggunakan bakteri *Paenibacillus* sp. dalam menekan intensitas penyakit dan meningkatkan pertumbuhan tanaman padi. Metode penelitian ini dilakukan dengan metode RAL (Rancangan Acak Lengkap) dengan 4 perlakuan P0 = Bakterisida *Streptomisin* 0,2%, P1 = Isolat *Paenibacillus* sp., P2 = *Bacillus* BTH 22, P3 = *Paenibacillus polymyxa* dan 5 ulangan. Hasil penelitian menunjukkan perlakuan perendaman benih menggunakan bakteri *Paenibacillus* sp. dengan dosis 20 ml/g cukup efektif dalam meningkatkan daya perkecambahan sebesar 91,25%, kecepatan tumbuh sebesar 4,33% dan indeks vigor sebesar 9,53%

dibandingkan dengan isolat *Bacillus* sp. BTH 22 dan *Paenibacillus polymyxa.* Selain itu, perlakuan perendaman benih menggunakan bakteri *Paenibacillus* sp. mampu memperpanjang masa inkubasi bakteri *Xanthomonas* sp. terlama selama 3 HSI dibandingkan dengan perlakuan kontrol dengan intensitas serangan penyakit terendah sebesar 10,21%, tingkat efikasi tertinggi sebesar 53,32%, dan tinggi tanaman tertinggi sebesar 47,24 cm.

Kata kunci: Tanaman padi; perendaman benih; *Paenibacillus* sp; *Xanthomonas* sp.

FOREWORD

Praise and gratitude I extend to Allah SWT for his will, enabling the author to complete the preparation of the thesis titled "Efficacy of Seed Soaking Using *Paenibacillus* sp. Bacteria to Control *Xanthomonas* sp. Leaf Blight Disease in Rice Plants".

The preparation and submission of this thesis is one of the requirements to complete the study and obtain a Bachelor of Agriculture degree in the Agrotechnology Study Program, Faculty of Agriculture, Universitas Pembangunan Nasional 'Veteran' Jawa Timur. In the process of compiling this thesis, the author received a lot of support and guidance from the professors, family, and friends. Therefore, the author would like to express the deepest gratitude to:

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The author hopes that this proposal can be beneficial for readers to enhance their understanding in the field of agriculture, particularly on pests and plant diseases.

Surabaya, August 2025

Writer

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