

**THE EFFECT OF VARIOUS POPULATION DENSITIES OF *Bacillus* sp.
IN SUPPRESSING BLAST DISEASE (*Pyricularia oryzae*)
IN RICE PLANTS**

THESIS



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SURABAYA
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Submitted To The Agrotechnology Department
To Earn A Bachelor's Degree In Agriculture



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Advancing Effect of *Bacillus* sp. Densities on the Suppression of Blast in Rice Caused by *Pyricularia oryzae*

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Abstract

This study aimed to evaluate the effectiveness of *Bacillus* sp. isolate D28 in suppressing *Pyricularia oryzae*, the causal agent of rice blast, and determine the optimal population density for biological control. The study was conducted from March to June 2026 at the Plant Health Laboratory 1 of UPN “Veteran” East Java (in vitro) and the East Java Greenhouse Unit (in vivo). A Completely Randomized Design (CRD) with four treatments and six replicates was used: a control (*P. oryzae* alone) and *Bacillus* sp. at 10^7 , 10^8 , and 10^9 CFU/mL combined with *P. oryzae* inoculation. Pathogenicity tests confirmed virulence, with symptoms appearing 3 days after inoculation (DAI) and disease severity of 33.33%. In vitro antagonism tests showed the largest inhibition zone at 10^9 CFU/mL (9.58 mm), although it was not significantly different from 10^8 CFU/mL (7.50 mm). Suppression occurred through competition, lysis, and antibiosis, causing hyphal deformation, including shrinkage, swelling, and loss of septa. In vivo, 10^8 and 10^9 CFU/mL significantly reduced disease severity at 28 DAI to 10.41–11.11%, compared with 23.61% in the control, whereas 10^7 CFU/mL was ineffective. The highest efficacy was observed at 10^9 CFU/mL, with 55.87% inhibition and improved growth, particularly leaf number at 49 days after sowing (DAS), reaching 40.33 leaves. Thus, *Bacillus* sp. isolate D28 effectively suppressed rice blast, with 108 CFU/mL identified as the optimal concentration.

Keywords : *Bacillus* sp., *Pyricularia oryzae*, Blast, Densities, *Oryza sativa*

FOREWORD

All praise and thanks be to God Almighty, for through His grace and blessings, the author was able to complete this thesis proposal titled “The Effect of Various Population Densities of *Bacillus* sp. in Suppressing Blast Disease (*Pyricularia oryzae*) in Rice Plants” This thesis proposal was prepared to fulfill the final requirement of the Agrotechnology Study Program. In writing this report, the author received a great deal of assistance, both moral and material. Therefore, the author would like to take this opportunity to express gratitude to:

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The author sincerely welcomes constructive criticism and suggestions as input for evaluating this thesis proposal. May this thesis proposal provide valuable information regarding science and technology.

Surabaya, September 2026

The Author

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