

# **Exploration of *Bacillus* sp.-derived Secondary Metabolite Compounds as Anti-Foodborne Pathogen Bacteria using Metabolomic and Genomic Analysis**

Thesis

Presented as Partial Fulfilment for the Requirement  
to obtain a Master Degree

in Biotechnology Study Program



Submitted by

**Tsania Taskia Nabila**

22/499542/PMU/11097

to

THE GRADUATE SCHOOL  
UNIVERSITAS GADJAH MADA  
YOGYAKARTA

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Tsania Taskia Nabila  
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was defended before the Board of Examiners

on the date August 13, 2024

Board of Examiners

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This thesis was declared acceptable.  
to obtain the master's degree

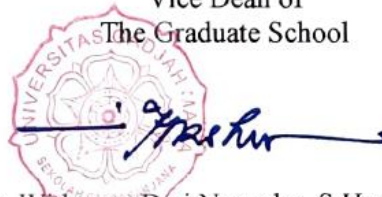
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## STATEMENT

### STATEMENT

The undersigned below:

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Student ID Number : 22/499542/PMU/11097

Study Program : Biotechnology Master Program

I hereby declare that this thesis has never been submitted to obtain a degree at any other university, and to my knowledge does not contain the work or opinion ever written or published by others, except the writing which is clearly referred to in this manuscript and mentioned in the bibliography.

I certify that this document is free from plagiarism and if the document is later proven to be a plagiarism work from other author's work and/or intentionally submit work or opinion from other author, then author is willing to get academic sanction and/or legal sanction.

Yogyakarta, June 8<sup>th</sup> 2024



Tsania Taskia Nabila  
22/499542/PMU/11097



## PREFACE

*Assalamu 'alaikum warahmatullahi wabarakatuh*

First, I would like to say great gratitude to Almighty Allah for His grace and guidance to assist me in finishing this research proposal as well as I could. *Sherawat* and *salaam* are always raised to the honorable Prophet Muhammad (Peace be Upon Him).

A graduate thesis is compulsory for all college students aiming to complete their final semester. This requirement is based on the necessity for every research project to include a well-documented background, follow a systematic methodology, and present results that can be validated and utilized for future research. I wrote this thesis to document my master's research titled "**Exploration of *Bacillus* sp.-derived Secondary Metabolite Compounds as Anti-Foodborne Pathogen Bacteria using Metabolomic and Genomic Analysis**" and to prepare it for publication as a research article. I could not believe that I have accomplished this thesis with a big effort. Most of the struggles and experiences recorded in this research report have occurred with unwavering supports and pieces of advice to keep my spirit up throughout the process. Many thanks have always been said to

1. Dr. Widyanto Dwi Nugroho, S.Hut, M.Agr as the Vice Dean of the Faculty of Graduate School at Universitas Gadjah Mada, who authorized and encouraged all his students to complete their thesis and graduate promptly.
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The thesis is surely may have numerous errors so I hope there will be any structural advice, opinions, or criticism which can be retrieved for correction purposes.

*Wassalamu'alaikum warahmatullahi wabarakatuh*

Yogyakarta, June 2024

The Author