THE POTENTIAL OF LIMA BEAN FLOUR (*Phaseolus lunatus*)
IN IMPROVING COGNITIVE FUNCTION AND GROWTH RECOVERY OF
MALNUTRITION RATS

UNDERGRADUATE THESIS

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FACULTY OF MATHEMATICS AND NATURAL SCIENCE
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This Undergraduate Thesis is Submitted as One of the Requirements to Obtain
a Bachelor of Science Degree in Biology Studies

BY
AZIZAH AMATU ZIKRAH
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Padang, August 4, 2023
Approved By:

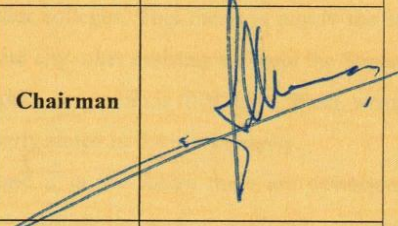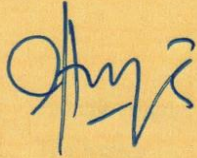Supervisor   Co-Supervisor

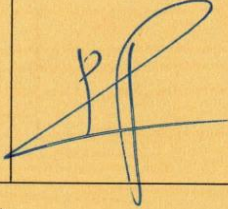Dr. Rita Maliza   Robby Jannatan, M.Si.
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This Undergraduate Thesis as Defended in Front of the Biology
Undergraduate Exam Committee, Faculty of Mathematics and Natural
Sciences, Andalas University on August 4, 2023.

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1	Kurniadi Ilham, M.Si.	Chairman	
2	Dr. Rita Maliza	Secretary	
3	Robby Jannatan, M.Si.	Member	
4	Prof. Ir. Efrizal, Ph.D.	Member	
5	Dr. Putra Santoso	Member	

STATEMENT OF AUTHENTICITY

Here I hereby declare that:

My undergraduate thesis is original and never been submitted for a bachelor's degree either Andalas University or other colleges. This thesis is purely the idea of my own formulation and research without any other assistance except the Supervisor.

In this thesis there are no works or opinions that have been written or published by others, except they are clearly stated in the bibliography.

I made this statement in fact and if in the future there are deviations and untruths in this statement, then I am willing to accept academic sanctions in accordance with the applicable rules.
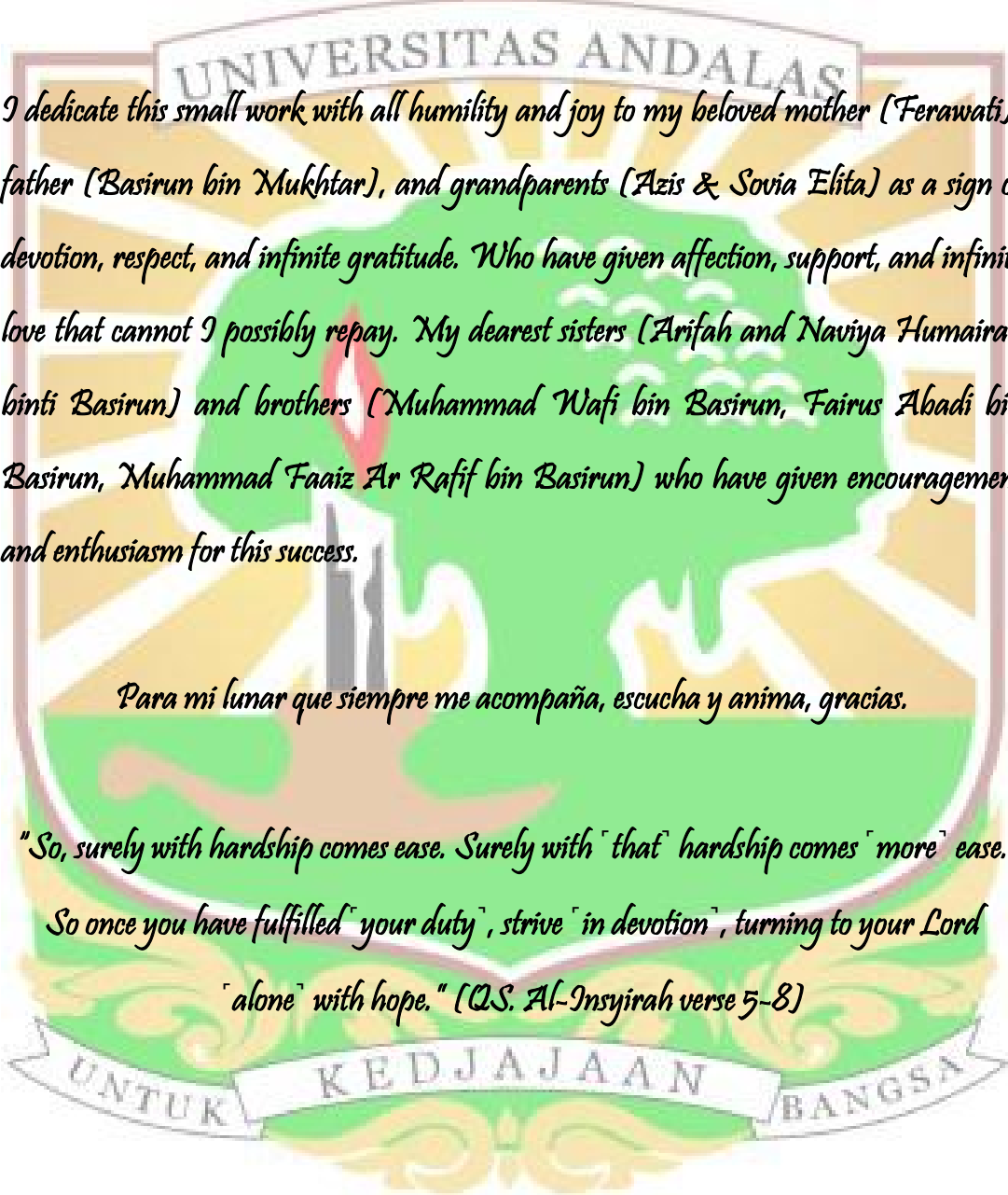
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Praise be to Allah SWT.

Shalawat and greetings to the Prophet Muhammad SAW.

I dedicate this small work with all humility and joy to my beloved mother (Ferawati), father (Basirun bin Mukhtar), and grandparents (Azis & Sovia Elita) as a sign of devotion, respect, and infinite gratitude. Who have given affection, support, and infinite love that cannot I possibly repay. My dearest sisters (Arifah and Naviya Humairah binti Basirun) and brothers (Muhammad Wafi bin Basirun, Fairus Abadi bin Basirun, Muhammad Faaiz Ar Rafif bin Basirun) who have given encouragement and enthusiasm for this success.

Para mi lunar que siempre me acompaña, escucha y anima, gracias.

"So, surely with hardship comes ease. Surely with ˹that˺ hardship comes ˹more˺ ease. So once you have fulfilled ˹your duty˺, strive ˹in devotion˺, turning to your Lord ˹alone˺ with hope." (QS. Al-Insyirah verse 5-8)

Azizah Amatu Zikrah, S.Si.

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Author

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ABSTRACT

Malnutrition is a condition characterized by inadequate or excessive consumption of nutrients, resulting decrease cognitive abilities, metabolic disorders, learning disabilities, growth retardation, decreased immune system, and the risk of death. The percentage of malnutrition prevalence in Indonesia was still relatively high, around 21,6%. This research aims to investigate the potential of lima beans (*Phaseolus lunatus*) in promoting growth recovery and improving cognitive function in malnourished rats. Four groups of male white rats were included in this study: The control group (P1), Malnutrition group (P2), Malnutrition + 25% Lima Bean group (P3), and Malnutrition + 50% Lima Bean group (P4). Morphometric analysis was used to assess growth recovery. Cognitive tests included Y-Maze, Novel Object Recognition Test (NORT), and Water Maze by Morris (MWM) test, and histopathological examination of the brain sections was conducted on the cerebral cortex and hippocampus by hematoxylin and eosin stains. This study found that lima bean flour increased body weight, body length, tail length, and ear length in malnourished rats at 50% lima bean concentration, similar to the control group. Lima bean flour showed neuroprotective on the cerebral cortex and hippocampus by lowering the percentage of degenerated cells and increasing cognitive and behavioral.

Keywords: *Malnutrition, Phaseolus lunatus, Growth recovery, cognitive function, neuroprotective.*