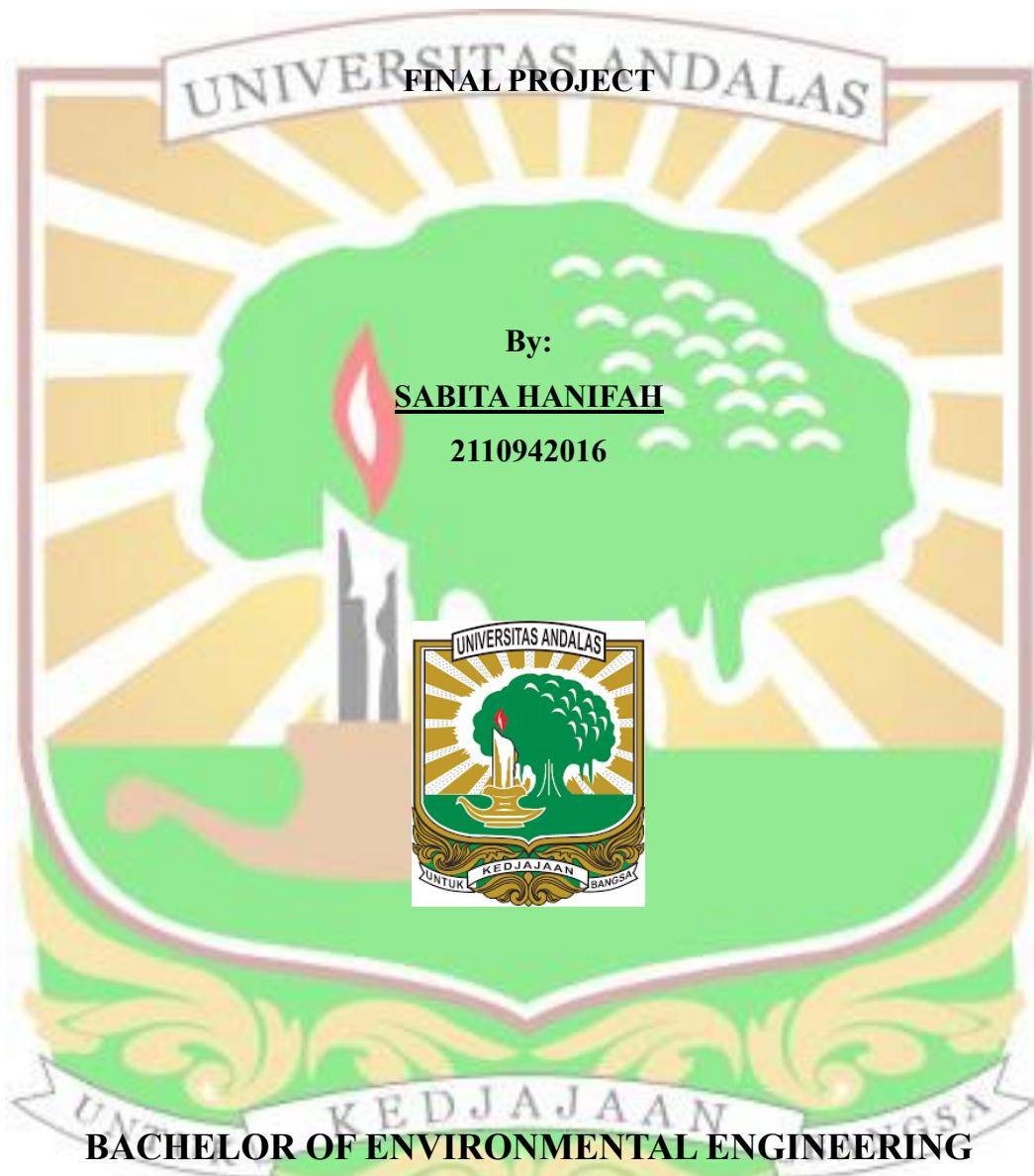


**IDENTIFICATION OF NITRIFYING BACTERIA IN
UNTREATED PALM OIL MILL EFFLUENT DIGESTATE
(POMED®) AND ITS NITRIFICATION POTENTIAL FOR
AGRICULTURAL APPLICATION**



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FINAL PROJECT

As one of The requirement to complete
Strata – 1 Program at
Department of Environmental Engineering
Faculty of Engineering Universitas Andalas

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ABSTRACT

Biological treatment ponds for palm oil mill effluent produce a by-product, Palm Oil Mill Effluent Digestate (POMED®). Mills usually store POMED® in dumping ponds to produce treated POMED®. The rainy season usually causes overflow problems in dumping ponds. This study aims to evaluate the use of untreated POMED® as a bio-organic fertiliser by identifying nitrifying microbes, measuring its nitrification capacity, and assessing its effects on soil chemical properties (pH and C/N Ratio). 16S rRNA gene sequencing profiled the nitrifying microbial community of untreated POMED®. Soil incubation experiments were conducted for 14 days with four treatments: control (T1), half dose of POMED® (T2), normal dose of POMED® (T3), and urea fertiliser (T4). Nitrification potential was measured according to ISO 15685:2012, and changes in inorganic nitrogen (Total Ammonia Nitrogen, NO_2^- , NO_3^-), pH, and C/N ratio underwent analysis. The microbial profile showed a diverse community in untreated POMED®, with Nitrosomonas identified as the AOB (0.128% relative abundance) and Nitrospina as NOB (0.020%). In T3, nitrate (NO_3^-) and TAN concentrations increased by 19.32% and 33.36%, respectively, and ammonia and nitrate oxidation rates were higher than in the control. However, the application of untreated POMED® also caused soil acidification with a decrease in pH from 6.9 to 5.0 due to nitrification and a high C/N ratio (43-77), indicating the potential for microbial nitrogen immobilisation.

Keyword: *Bio-organic fertilizer, nitrifying microorganisms, nitrification, POMED*

