

**ANAEROBIC CO-DIGESTION OF OIL PALM FROND
AND PALM OIL MILL EFFLUENT FOR BIOGAS PRODUCTION**

By

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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.



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ABSTRACT

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The palm oil is a significant industry in Indonesia, with a total plantation area of 14.33 million hectares and CPO production of 46.82 million tons in the year 2022. Two significant wastes are the oil palm fronds (OPF) and palm oil mill effluent (POME). These wastes can be processed into biogas, a renewable energy source. Anaerobic co-digestion of OPF, POME, and cattle manure (CM) is studied to observe the effect of mixing ratio on biogas production quantity and quality, as well as the relation of total solids (TS) and volatile solids (VS) content with biogas production. The mixing combinations are OPF:CM (1:10) in mass ratio, OPF:POME (1:35) in mass/volume ratio, and OPF:POME:CM (1:25:10, 1:35:10, 1:45:10) in mass/volume/mass ratio. The highest cumulative biogas yield was achieved at 28.93 ml (SD = 19.82) by the OPF:POME mix of 1:35. Biogas production is observed to increase as total solids content decrease, while it was found that biogas production increases along with volatile solids content.

Keywords: Anaerobic co-digestion, mixing ratio, OPF, POME, CM, biogas production, total solids and volatile solids content.

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DEDICATION

To the people who believed that I could,
even when I didn't believe in myself.

ACKNOWLEDGEMENTS

Finally! Soon I will complete my time as a Bachelor's student and actually graduate as an engineer, something I have dreamed of since my middle school years. Up until this moment I have gone through so many life-changing seasons, where I have often times failed but also grew out of them stronger and more beautiful. This has been far from an easy journey. It was confusing, stressful, exciting, touching, and somewhat fun. Yet it was all thanks to those who were with me, that I am finally here.

First and foremost, I thank my God, who has always been and will always be with me through my highs and lows, and who is constantly shaping me like clay in a potter's hand.

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