

**MICROENCAPSULATION OF ETHANOLIC LEMONGRASS EXTRACT
THROUGH IONIC GELATION – EXTRUSION METHOD TO PRESERVE
AGI ACTIVITY WITH CONTROLLED RELEASE ABILITY**

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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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Diabetes Mellitus (DM) is a critical global health issue, contributing significantly to morbidity and mortality worldwide. Current synthetic antidiabetic medications, while effective, often carry adverse effects that necessitate exploring safer alternatives. One of the potential a natural resource is *Cymbopogon citratus* (lemongrass) which has alpha-glucosidase inhibitor (AGI) activity. This study aims to develop a controlled release microcapsule of lemongrass extract with good AGI activity, ensured controlled release system, and has a moisture content $\leq 10\%$. Lemongrass was extracted using maceration method and microencapsulated by sodium alginate and chitosan using ionic gelation - extrusion method, followed by drying in a dehydrator. The best microencapsulation mixture was obtained from a 1.97:1:2 mass ratio of lemongrass extract TSS to chitosan to sodium alginate with an encapsulation efficiency of $89.29\% \pm 0.00$ and 40°C was chosen as the most suitable drying temperature. The AGI activity of the resulting dried microcapsules reached 9.326 % Inhibition in 24.67 mg/mL concentration and 81.55% of the lemongrass extract AGI activity was preserved. The microcapsule was proven to have a controlled release ability with a release of $67.10\% \pm 0.04$ of its bioactive compound at the 12th hour. Furthermore, the phenolic content was also found to be positively correlated with the AGI activity produced by lemongrass extract.

Keywords: *Diabetes Mellitus, Lemongrass, Alpha Glucosidase Inhibitor, Controlled Release, Moisture Content*

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DEDICATION

I dedicate this work for the future researchers to be used to improve people's health and creating smiles in families effected by diabetes in order to make the world a better place.

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