



**The College of Graduate Studies and the College of Engineering Cordially Invite You to a  
Master Thesis Defense**

Entitled

*Utilizing date pits in microencapsulation: Effect of different variations on Probiotic survivability under in vitro digestion*

By

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Date and Time:

Wednesday, 30 November 2022

At 11:30 A.M

Venue: F3-Room40

Abstract

This thesis is concerned with utilizing date pit powder in a medical way that will turn it from waste into a beneficial stabilizer for the release of beneficial probiotics in the intestine of the human body. The main objective of this thesis is to encapsulate probiotics using date pit-based beads and then to be released them in the intestine of the human body. The gravitational dripping technique was used for the formation of the beads, as well as the INFOGEST protocol was used for the testing experiment of the digested beads and the release of viable probiotic cells. The study showed the enhanced viable probiotic cells in the intestinal phase in the presence of date pits in the beads. Three types of date, Raziz, Naghal, and Khadrawy showed that 0.1g of date pit powder for each 0.2g sodium alginate in the solution mixture, which means a ratio of (0.5:1), is the best scenario to follow for the highest viable probiotic cells desired, Log<sub>10</sub> CFU/mL 5.8, 5.3 and 4.7 respectively. On the other hand, the Lulu date pit showed that the ratio of 1:1 date pit powder and sodium alginate colonizes the highest viable probiotic cells of 10<sup>6</sup> CFU/mL, while Naptit Saif showed the lowest amount of date pit powder needed in the mixture to have the highest viable probiotic cells of Log<sub>10</sub> 6.2 CFU/mL. So, utilizing the date pit powder, which was considered waste, showed great results in the sense of encapsulating beneficial probiotics and delivering them to the targeted organ of the body. Furthermore, the encapsulation technique is approved to be considered as a protection procedure for the survival of probiotics to reach the intestine because the resulting count of free cells bacteria was zero, which means no viable probiotic cells after performing the simulated digestion system on free cells. One more finding to be mentioned is that treating date pit powder with water before performing the INFOGEST protocol gave lower viable probiotic cells, which ranged from Log<sub>10</sub> 3.9 – 4.7 CFU/mL compared to the viable probiotic cells range of using raw date pit with only washing, drying and grinding it, which was Log<sub>10</sub> 5.1 – 6 CFU/mL.

**Keywords:** Encapsulation, Probiotics, Date Pit, Gravitational dripping, INFOGEST, Viable probiotic cells.