

**ENKAPSULASI *Lactiplantibacillus plantarum* SN13T DENGAN
BAHAN PENYALUT ALGINAT DAN TEPUNG BENGGUANG
(*Pachyrhizuz erosus*) SERTA APLIKASINYA TERHADAP ES
KRIM**



TESIS

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UNIVERSITAS ANDALAS

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SERTA APLIKASINYA TERHADAP ES KRIM**

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ABSTRAK

Penelitian ini bertujuan untuk meningkatkan viabilitas dan efektivitas *Lactiplantibacillus plantarum* SN13T sebagai probiotik melalui teknik enkapsulasi dengan metode ekstrusi menggunakan bahan penyalut alginat dan tepung bengkuang. Penelitian dilakukan dalam dua tahap. Tahap I merupakan percobaan untuk memperoleh formulasi enkapsulasi terbaik dengan Rancangan Acak Kelompok (RAK) menggunakan empat perlakuan dan lima ulangan, yaitu variasi penambahan tepung bengkuang 0% (A), 1% (B), 3% (C), dan 5% (D). Parameter yang diamati meliputi kadar air, ukuran serta morfologi *beads*, total koloni bakteri asam laktat (BAL), ketahanan terhadap *simulated gastric juice* (SGJ), dan *simulated intestinal juice* (SIJ). Hasil terbaik diperoleh pada perlakuan B (1% alginat + 1% tepung bengkuang) dengan kadar air 97.34%, ukuran *beads* 2.14 mm, total koloni BAL 12.88 Log CFU/mL, ketahanan terhadap SGJ 95.23%, serta ketahanan terhadap SIJ 95.76%. Tahap II merupakan aplikasi hasil enkapsulasi terbaik ke dalam produk es krim probiotik, serta pengujian viabilitasnya selama penyimpanan 60 hari pada suhu -18°C. Penelitian ini menggunakan RAK faktorial 2 × 4 dengan tiga ulangan, yaitu faktor A (penambahan probiotik; tanpa enkapsulasi (A1) dan dengan enkapsulasi (A2)) serta faktor B (lama penyimpanan: 1 hari (B1), 20 hari (B2), 40 hari (B3), dan 60 hari (B4)). Parameter yang diuji meliputi kadar lemak, protein, air, pH, total koloni BAL, ketahanan terhadap SGJ dan SIJ, serta sifat organoleptik (warna, rasa, tekstur, aroma). Hasil penelitian menunjukkan bahwa penambahan *Lactiplantibacillus plantarum* SN13T dalam bentuk enkapsulasi pada es krim terbukti lebih mampu mempertahankan viabilitas bakteri probiotik, ketahanan terhadap SGJ dan SIJ, serta mutu fisik-kimia dan organoleptik produk hingga 60 hari penyimpanan. Hasil ini menunjukkan bahwa enkapsulasi dapat meningkatkan daya simpan dan kualitas probiotik dibandingkan tanpa enkapsulasi.

Kata kunci: alginat, enkapsulasi, *Lactiplantibacillus plantarum* SN13T, tepung bengkuang, es krim.

ENCAPSULATION of *Lactiplantibacillus plantarum* SN13T WITH WALL MATERIALS ALGINATE AND BENGKUANG FLOUR (*Pachyrhizus erosus*) AND ITS APPLICATION TO ICE CREAM

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ABSTRACT

This study aims to enhance the viability and effectiveness of *Lactiplantibacillus plantarum* SN13T as a probiotic through encapsulation techniques using the extrusion method with alginate and bengkuang flour as wall materials. The research was carried out in two stages. Stage I was an experiment to obtain the best encapsulation formulation using a Randomized Block Design (RBD) with four treatments and five replications, namely variations in the addition of bengkuang flour at 0% (A), 1% (B), 3% (C), and 5% (D). The observed parameters included moisture content, bead size and morphology, total lactic acid bacteria (LAB) colonies, resistance to simulated gastric juice (SGJ), and simulated intestinal juice (SIJ). The best results were obtained in treatment B (1% alginate + 1% bengkuang flour), with a moisture content of 97.34%, bead size of 2.14 mm, total LAB colonies of 12.88 Log CFU/mL, resistance to SGJ of 95.23%, and resistance to SIJ of 95.76%. Stage II involved the application of the best encapsulation result into probiotic ice cream products and testing its viability during 60 days of storage at -18°C. This study used a 2 × 4 factorial RBD with three replications, namely factor A (probiotic addition; without encapsulation (A1) and with encapsulation (A2)), and factor B (storage duration: 1 day (B1), 20 days (B2), 40 days (B3), and 60 days (B4)). The tested parameters included fat, protein, moisture content, pH, total LAB colonies, resistance to SGJ and SIJ, as well as organoleptic properties (color, taste, texture, aroma). The results showed that the addition of encapsulated *Lactiplantibacillus plantarum* SN13T to ice cream was more effective in maintaining the viability of probiotic bacteria, resistance to SGJ and SIJ, as well as the physico-chemical and organoleptic quality of the product for up to 60 days of storage. These results indicate that encapsulation can improve the shelf life and quality of probiotics compared to non-encapsulated forms.

Keywords: alginate, encapsulation, *Lactiplantibacillus plantarum* SN13T, bengkuang flour, ice cream.