

SUMMARY

Lactic Acid Bacteria (LAB) play an important role in human health as probiotic agents by inhibiting pathogenic bacteria that cause digestive disorders. However, viability decreases under extreme pH conditions in the gastrointestinal tract. Encapsulation using sodium alginate effectively protects LAB from adverse environmental conditions, helping to maintain cell viability during storage. Since the utilization of pure alginate is not sufficient to fully preserve LAB viability, supplementation with nutrients from pineapple juice is required. This study aimed to determine the viability of LAB LG-90 encapsulated with sodium alginate and pineapple juice under simulated gastrointestinal pH stress, as well as during 4 weeks of storage at 4°C.

This study employed an experimental approach using a Completely Randomized Design (CRD) for simulated pH-stress testing and a Factorial Completely Randomized Design (FCRD) for storage duration. The independent variable consisted of the encapsulation treatments applied to LAB LG-90, both under simulated pH conditions and during storage, as well as the storage durations. The dependent variables were the viability of LAB under simulated gastric and intestinal pH stress and across storage duration. The viability of LAB LG-90 encapsulated under simulated gastric and intestinal conditions was expressed as the percentage of surviving cells determined by the Total Plate Count (TPC) method, whereas the viability observed during storage was expressed as the total bacterial population obtained from the same method.

Encapsulation of LAB LG-90 with sodium alginate or sodium alginate-pineapple juice improved cell survival under simulated gastric (pH 3) and intestinal (pH 7.2) conditions compared to free cells, resulting in viabilities of 46.04% and 40.89% compared to 24.78% in free cells (BNT, $p < 0.05$). During four weeks of storage at 4°C, encapsulated cells maintained higher population stability (8.17–8.28 log CFU/g) than free cells (8.09 log CFU/g), demonstrating that encapsulation protects LAB LG-90 from pH stress and preserves viability. These findings contribute to understanding probiotic protection mechanisms and suggest the practical potential of sodium alginate and pineapple extract for stable probiotic formulations.

Keywords: *encapsulation, pineapple juice, pH stress, storage, viability.*