Abstract

Osama M Morsy

Anthocyanin-Colored Microencapsulation Effects on Survival Rate of Lactobacillus rhamnosus GG, Color Stability, and Sensory Parameters in Strawberry Nectar Model

Probiotic microencapsulation is a promising way to produce functional food, while their stability and sensory acceptability still a challenge. This study aims to enhance the functional properties of strawberry (Fragaria × ananassa, cultivar Camarosa) nectar and sensory acceptance using novel anthocyanin-colored microencapsulation of Lactobacillus rhamnosus. Four formulations (F1–F4) of coated materials (alginate, whey protein, and pullulan) integrated with anthocyanin pigment were used for encapsulation. The physical properties of microencapsulated probiotics (size, color, efficiency, stability, and survival rate) and quality parameters of nectar (pH, anthocyanin, and sensory acceptability) during 4 weeks of storage at 4 and 25 °C were evaluated. All formulations exhibited high encapsulation efficiency (> 89%), medium bead size (406–504 ?m), and proper color (red color). The microencapsulated cells were stable in simulated gastrointestinal and processing conditions (up 7 log10 CFU mL⁻¹) compared to free cells. F4 (alginate 2% + anthocyanin 0.1% + whey protein 2% + pullulan 2% + cocoa butter 1% + L. rhamnosus GG) showed the greatest viability in nectar during storage (6.72 log10 CFU mL⁻¹/4 °C/4 weeks), while a significant decrease in pH (≤ 2) and anthocyanin (≤ 60 mg 100 g⁻¹) was observed in nectar-containing free cells. The sensory scores with a difference-preference test as exploratory and preliminary responses revealed that colored probiotic microcapsules enhanced the sensory characters (up to 4 weeks) and commercially accepted (> 80% agreed) of strawberry nectar. Results demonstrated that anthocyanin-colored alginate-whey protein-pullulan matrix had the potential to enhance probiotic viability in functional nectar without negative impact.