

Abstract

Snakehead fish (*Channa striata*) albumin provides health benefits, but its pungent aroma and susceptibility to phase separation limit its application in liquid foods. This study developed a shelf-stable, semi-solid functional gel incorporating a 1.5% *C. striata* albumin extract encapsulated within a synergistic hydrocolloid system, using botanical extracts (açaí berry, red ginger, and lemon) for bioactivity, functional flavor, and color. Four formulations were evaluated over 21 days of refrigerated storage: Control 1 (1% κ -carrageenan κ -CA), Control 2 (1% konjac glucomannan KGM), Treatment 1 (0.70% κ -CA:0.30% KGM), and Treatment 2 (0.30% κ -CA:0.70% KGM). Results showed that Treatment 1 (the optimized 0.70%:0.30% hydrocolloid blend matrix) exhibited a good structural stability, uniformly entrapping opaque albumin particles to maintain uniform color and prevent protein precipitation. Textural analysis revealed its hardness increased from 429.6 g on Day 0 to 471.6 g by Day 21, while maintaining water activity tightly between 0.90 and 0.92 across the three-week period. Treatment 1 also successfully minimized fluid loss, with syneresis peaking at a minimal 1.82% on Day 14 before stabilizing at 1.45% on Day 21. Conversely, Control 1 suffered severe, progressive syneresis (18.75% by Day 21), and Control 2 failed to gel, resulting in phase separation and not being able to form a firm gel. Overall, the synergistic 0.70% κ -CA and 0.30% KGM network effectively stabilizes fish albumin in an acidic environment. This formulation establishes a viable framework for delivering a shelf-stable, and bioavailable gel.

Keyword: Albumin extract, *Channa Striata*, Kappa-carrageenan, Konjac glucomannan, physical stability, syneresis, synergistic hydrocolloid gel