

Abstract

Sugarcane juice is a sweet beverage that is naturally high in sucrose and susceptible to microbial contamination, which becomes a major concern for most health-conscious consumers. This study aimed to develop a functional sugarcane juice enriched with fructooligosaccharides (FOS) through enzymatic treatment and further processing it with high pressure processing (HPP) to preserve its quality and safety. The enzymatic conversion of sucrose to FOS was performed using Pectinex® Ultra SP-L with varying enzyme concentrations, temperatures, and incubation times to obtain the most optimal enzymatic conditions via Response Surface Methodology (RSM). Under optimized conditions (1000 U/g enzyme concentration; 48°C; 13 hours), enzymatic treatment could produce 16.02 ± 0.58 mg/mL of reducing sugar, reduce sucrose level (59.17 g/L), and increase FOS yield: kestose (2.37 g/L) and nystose (9.35 g/L). Furthermore, the juice was then subjected to HPP at 600 MPa and different holding times (2, 5, and 10 minutes) to discover the most optimal HPP conditions for inactivating *E. coli* K12 and *L. innocua*. HPP at optimal conditions (600 MPa for 3 minutes) could inactivate all surrogate bacteria with >5 log reduction, meeting the USFDA standard requirements. Furthermore, it was also observed that HPP might reduce yeast to 6.56×10^2 CFU/mL and maintain the physicochemical properties, sugar content, total phenolic content, and antioxidant activity without showing significant differences compared to the non-treated sample except for total soluble solid content, L^* , a^* , glucose content, and fructose content. HPP also has been shown to have better quality retention than pasteurization. This study is beneficial to study the effects of enzymatic treatment in developing FOS-rich product and HPP in enhancing product safety and quality.

Keywords: Sugarcane Juice; Enzymatic Treatment; Fructooligosaccharides; High Pressure Processing