

Effect of high-intensity ultrasound treatment in combination with transglutaminase and nanoparticles on structural, mechanical, and physicochemical properties of quinoa proteins/chitosan edible films

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Abstract

The effect of high-intensity ultrasound (US) combined with transglutaminase treatment (TG) and the inclusion of nanoparticles (Np) on the structural, mechanical, barrier, and physicochemical properties of quinoa protein/chitosan composite edible films were evaluated. Structurally it was observed that the maximum temperatures of the thermal degradation increased with the use of combined US and TG treatment, generating films with superior thermal stability. FTIR results showed that in the amide zone I oscillations of the polypeptide structure were related to the stretching vibrations of C=O in the US/TG-Np edible film. Which has generally been associated with changes in the structure and formation of covalent bonds by the action of TG. The US improved mechanical properties by increasing the tensile strength (with or without the application of TG). While combining US-TG produced a significant increase in thickness, decrease in elongation percentage, and increase in tensile strength. Which can be attributed to cross-linking produced by TG. Water vapour permeability increased in all cases. In general, the combination of US-TG treatments showed a more pronounced effect on the structure and mechanical properties. (C) 2019 Published by Elsevier B.V.

Palabras clave

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