

Title Impact of edible coatings and mild heat shocks on quality of minimally processed broccoli (*Brassica oleracea* L.) during refrigerated storage

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Abstract

The effects of edible coatings and mild heat shocks on quality aspects of refrigerated broccoli were studied. Minimally processed broccoli was coated with either chitosan or carboxymethyl-cellulose with or without a previous application of a mild heat shock of 1.5 min at 50 °C. Product was packaged in multilayered polyolefin bags and stored at 5 °C for 18 d. Quality parameters such as weight loss, texture, colour, ascorbic acid content, total chlorophyll content, oxygen concentration inside the bags, browning potential, mesophilic aerobic counts, and sensory quality, were evaluated during storage. Edible coatings exhibited a beneficial impact on broccoli quality. The weight loss in uncoated broccoli was found to be between 2 and 5 times higher compared to coated samples. During storage, coated florets from both thermally and non-thermally treated samples, presented higher retention of the ($-a^*/b^*$) ratio indicating better green colour retention and a reduced rate of floret yellowing. Chitosan coating always presented the lower ascorbic acid degradation rates (twofold lower compared with control samples). Broccoli texture for uncoated samples increased significantly during storage. However, for carboxymethyl-cellulose coated broccoli a slight increase in texture was observed while for chitosan coated broccoli no significant changes in texture were observed throughout the storage period. After the edible coating application the microbial broccoli load dropped by around 1.5 and 0.9 logarithmic units in chitosan and carboxymethyl-cellulose films, respectively. During storage, the application of chitosan coating significantly reduced total microbial counts in the thermally and non-thermally treated uncoated samples. Among the assayed edible coatings, chitosan effectively maintained quality attributes and extended shelf life of minimally processed broccoli. The single application of a mild heat shock had a measurable influence in reducing weight loss, enzymatic browning in broccoli stems, and in delaying yellowing of broccoli florets. Moreover, chitosan coating combined with a mild heat shock showed the best performance for long-term refrigerated storage of minimally processed broccoli.