Effect of hot air treatment on the conservation of broccoli (*Brassica oleracea* L.), cultivar 'Legacy'

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Abstract

Broccoli (*Brassica olaeracea* L.) is a product of great importance in international markets. However, it deteriorates quickly after harvest, characterized by color loss and bad appearance. The enzyme peroxidase (POD) is responsible for the degradation of chlorophyll and the emergence of black and brown pigments in the florets. As an alternative solution to this problem, a quarantine treatment using hot air was assessed to partially inactivate this enzyme and to increase the shelf life of the fresh product without altering its nutritional or physicochemical properties. A combination of temperatures between 55 and 48°C during times of between 1 and 3 hours was applied; POD activity was quantified and measured by spectrophotometry at a wavelength of 470 nm. The chlorophyll a and b concentrations were measured at wavelengths of 663 and 645 nm, respectively. Optimal conditions of enzymatic inactivation were 55°C and 3 hours, resulting in a residual POD activity of 11.04% and retaining 70.9% chlorophyll a and 16.6% chlorophyll b. This treatment increased the shelf life of the product to 6 days in storage under non-refrigerated conditions (17°C) and retained 75.19% of the remaining chlorophyll a and 70.21% of chlorophyll b, measured in respect to day-zero of the treated product. The effect of the thermal treatment on the respiration index (RI) was also assayed, obtaining a reduction of 54.1% as compared to day-zero for the control without treatment and a 77.3% reduction in the treated broccoli. These results show that the treatment was efficient. The texture values of the treated broccoli decreased by 73.2 and 33.6% in the treated product and the control, respectively. This effect is attributed to post-treatment metabolic reactions, resulting in loss of strength of the cell wall. It was concluded that the hot air treatment improves the general appearance of broccoli, but has a detrimental effect on its texture.