

Title Influence of combined hot air and UV-C treatment on the antioxidant system of minimally processed broccoli (*Brassica oleracea* L. var. *Italica*)

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Citation LWT - Food Science and Technology, Volume 43, Issue 9, November 2010, Pages 1313-1319

Keywords Antioxidant activity; Enzymes; Minimally processed broccoli; UV-C treatment; Heat treatment

Abstract

Broccoli develops a fast senescence that deteriorates the nutritional quality of the product. In this work, a combined treatment with hot air and UV-C were applied to minimally processed broccoli florets to investigate their effects on the antioxidant system during storage at 20 °C. Application of UV-C and heat enhanced by approximately 13% the levels of total antioxidants immediately after treatment. These levels were lower than initials in both control and treated samples. Nevertheless, higher values (ranged from 12 to 50%) were also detected in treated samples during storage. In general, higher values of antioxidants were correlated with elevated levels of phenols (from 10 to 17%) and ascorbic acid (from 11 to 17%) in treated florets. The increment in the content of phenolics in treated broccolis was correlated to an increased phenylalanine ammonia lyase (PAL) activity. The combined treatment also affects the activity of enzymes involved in removal of reactive oxygen species. An increase of about 50% in superoxide dismutase activity was detected after treatment. During the first days of storage this higher activity was about 40%. Enzymes that remove H₂O₂ like catalase and ascorbate peroxidase showed an enhanced activity toward the end of storage. The combined treatment diminished the peroxidase (POX) activity approximately 60% after the treatment and near 50% after two days of storage, suggesting a minor role of this enzyme in detoxification of H₂O₂. In conclusion, combined treatment may contribute to enhance the protection against oxidative molecules not only by increasing levels of phenolics and ascorbic acid but also by enhancing the activity of enzymes involved in removing reactive oxygen species.