

Title Combination of light exposure and low temperature in preserving quality and extending shelf-life of fresh-cut broccoli (*Brassica oleracea* L.)

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Abstract

Broccoli (*Brassica oleracea* L. var. *italica* Plenck) is perishable and susceptible to senescence after harvest with symptoms of de-greening and quality deterioration. Combinations of different intensities of light exposure ($24 \mu\text{mol m}^{-2} \text{s}^{-1}$, $6 \mu\text{mol m}^{-2} \text{s}^{-1}$, darkness) and storage temperatures (4, 7, 15 °C) were applied to investigate their effects on fresh-cut broccoli shelf-life and sensory quality including color, texture, odor, and acceptance during storage. The combinations of $24 \mu\text{mol m}^{-2} \text{s}^{-1}$ light exposure with 4 and 7 °C storage temperatures delayed sensory quality deterioration and prolonged shelf-life for over 3 d compared to other treatments. Considering cost savings, the combination of $24 \mu\text{mol m}^{-2} \text{s}^{-1}$ light exposure with 7 °C storage temperature was selected and subsequently employed to measure the influence of light exposure on fresh-cut broccoli nutritional quality associated with pigments, antioxidant power (AP), total phenols (TP), reduced ascorbic acid (AA), and fresh weight loss during 10 d shelf-life with darkness as a control. A $24 \mu\text{mol m}^{-2} \text{s}^{-1}$ intensity light exposure preserved higher levels of chlorophyll a, chlorophyll b, total chlorophyll, AP, TP, and AA throughout 10 d shelf-life at 7 °C compared to darkness. However, it accelerated fresh weight loss after 5 d storage, which progressively increased over time. In conclusion, the combination of $24 \mu\text{mol m}^{-2} \text{s}^{-1}$ intensity light exposure with 7 °C storage temperature maintained quality and extended shelf-life of fresh-cut broccoli.