

Article

Effect of Potassium Permanganate, Ultraviolet Radiation and Titanium Oxide as Ethylene Scavengers on Preservation of Postharvest Quality and Sensory Attributes of Broccoli Stored with Tomatoes

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Abstract: This study introduces an effective solution to enhance the postharvest preservation of broccoli, a vegetable highly sensitive to ethylene, a hormone produced by climacteric fruits such as tomatoes. The proposed method involves a triple combination of ethylene elimination techniques: potassium permanganate (KMnO₄) filters combined with ultraviolet radiation (UV-C) and titanium oxide (TiO₂), along with a continuous airflow to facilitate contact between ethylene and these oxidizing agents. The effectiveness of this approach was evaluated using various analytical techniques, including measurements of weight, soluble solids content, total acidity, maturity index, color, chlorophyll, total phenolic compounds, and sensory analysis conducted by experts. The results demonstrated a significant improvement in the physicochemical quality of postharvest broccoli when treated with the complete system. Notably, broccoli subjected to this innovative method exhibited enhanced organoleptic quality, with heightened flavors and aromas associated with fresh green produce. The implementation of this novel technique holds great potential for the food industry as it reduces postharvest losses, extends the shelf life of broccoli, and ultimately enhances product quality while minimizing waste. The successful development and implementation of this new technique can significantly improve the sustainability of the food industry while ensuring the provision of high-quality food to consumers.

Keywords: *Brassica oleracea* var. *italica*; climacteric fruit; ethylene scavengers; *Solanum lycopersicum* L.; susceptible vegetable

1. Introduction

Reducing food waste is a crucial task nowadays due to its economic, social, and environmental impact. It is estimated that worldwide, one-third of all food produced is lost or wasted, which is equivalent to approximately 1.3 billion tons annually [1]. This issue not only poses a problem in terms of wasted resources and loss of profits for farmers and the food industry but also has a negative impact on the environment due to the emission of greenhouse gases and the degradation of ecosystems [2]. One effective way to reduce food

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