

Effects of simultaneous UV-C radiation and ultrasonic energy postharvest treatment on bioactive compounds and antioxidant activity of tomatoes during storage

ABSTRACT

The effects of a novel technology utilizing a simultaneous combination of Ultraviolet-C radiation and ultrasound energy postharvest treatment on tomato bioactive compounds during 28 days' storage period was investigated by varying Ultraviolet-C radiation intensities of 639.37 or 897.16 $\mu\text{W}/\text{cm}^2$ at a constant ultrasound intensity of 13.87 W/L from a 40 kHz–1 kW transducer. A minimal treatment time of 240 s at Ultraviolet-C dosage of 2.15 kJ/m² was observed to provoke a considerable increase in bioactive compounds content, proportionated to treatment time. Although treatment led to temperature increase in the system reaching 39.33 °C due to heat generation by ultrasonic cavitation, the extractability and biosynthesis of phytochemicals were enhanced resulting in 90%, 30%, 60%, 20%, and 36% increases in lycopene, total phenols, vitamin C, hydrophilic and lipophilic antioxidant activities respectively. Results present the potential use of the combined non-thermal technologies as post-harvest treatment to improve bioactive compounds and antioxidant activity during storage.

Keyword: Phytochemicals; Biosynthesis; Cavitation; Dosage; Permeability; Membrane; Hydrophilic; Lipophilic