

Effect of mild high hydrostatic pressure treatments on physiological and physicochemical characteristics and carotenoid biosynthesis in postharvest mango

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Abstract

This study evaluated the effect of mild high hydrostatic pressure (HHP, 20–80 MPa /10 min) on the quality of the whole fresh mango during postharvest storage. HHP promoted the capacity of cell wall macromolecules binding water and prevented structural damage of mango tissues during postharvest storage. It reduced the respiration rate and the consumption of sugars and acids, and in most cases increased bioactive substances (vitamin C, total phenolics, flavonoids and carotenoids) and antioxidant activities. Moreover, HHP significantly increased carotenoid biosynthesis at the transcriptional level. The expressions of carotenogenic genes including geranylgeranyl diphosphate synthase (4.7 fold), phytoene synthase (4.66 fold), phytoene desaturase (3.53 fold), ζ -carotene desaturase (2.79 fold) and β -Ring hydroxylase (2.17 fold) were increased after HHP treatment, while zeaxanthin epoxidase (0.78 fold) transcripts were reduced. As a result, there was the increase of carotenes (1.56–2.00 fold), β -cryptoxanthin (1.38–2.73 fold) and zeaxanthin (1.42–1.67 fold) and the reduction of antheraxanthin (0.64–0.85 fold) and violaxanthin (0.88–0.90 fold) in HHP-treated samples. HHP is likely a potential technology for modulating physiology and nutritional components (especially carotenoids) of the postharvest fruit.