

Title Effect of heat-conditioning treatments on quality and phenolic composition of 'Fortune' mandarin fruit

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Abstract

'Fortune' mandarin fruit (hybrid of 'Dancy' mandarin x 'Clementine' mandarin) are very prone to chilling injury, manifested as pitting and necrosis in the outer part of the peel tissue, and therefore cannot withstand cold quarantine requirements. The aim of this work was to evaluate the effect of high-temperature conditioning on the tolerance of 'Fortune' mandarins to cold quarantine and on quality, organoleptic properties and phenolic composition of fruit. The fruit were conditioned for 1, 2 and 3 days at 37°C hot humid air (90-95% RH) and thereafter exposed to a single (16 days at 1.5°C) or a double (32 days at 1.5°C) quarantine treatment, followed by 4 days at 20°C shelf life. The 3 conditioning treatments were effective reducing chilling injury indexes to very low levels and allowed 'Fortune' mandarin to withstand not only a single but also a double quarantine treatment. Our results showed also that these treatments did not significantly affect either to the internal fruit quality, as measured by changes in acidity, total soluble content and total antioxidant capacity, or to fruit firmness and weight loss. Changes in phenolic composition of the pulp were studied in fruit conditioned for 1 day at 37°C, which did not alter the organoleptic acceptance of the fruits, and in non-conditioned fruits exposed to the quarantine treatment. More than 60 compounds, including flavonoids, cinnamic acid derivatives, coumarins and benzoic acids, were identified in the pulp of 'Fortune' mandarins, being hesperidin the most abundant. Phenolics were little affected in the conditioned and non-conditioned fruits after the quarantine treatments as no significant differences were found in the concentration of the most relevant compounds upon the cold quarantine storage conditions. Therefore, we can conclude that conditioning the fruit for 1 day at 37°C is a very effective heat-treatment allowing 'Fortune' mandarins to withstand quarantine treatments without affecting internal and external fruit quality or to the composition or the concentration of phenolic compounds relevant for nutrition in citrus fruit.