

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 a shelf life period of 4 days at 20°C. 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. In addition, our results showed that these treatments did not 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 40 phenolic compounds, including flavonoids, cinnamic acid derivatives and coumarins, were identified in the pulp of 'Fortune' mandarins, being hesperidin the most abundant followed by isorhoifolin, neoporphirin and narirutin. Little differences in phenolic compounds were found between conditioned and no conditioned fruits stored under low temperature conditions simulating quarantine requirements. 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 and concentration of phenolic compounds relevant for nutrition in citrus fruit.