Title Does ethylene degreening affect internal quality of citrus fruit?

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Abstract

Citrus fruit are non-climacteric. However, exposure to exogenous ethylene, e.g., during ethylene degreening, stimulates various ripening-related processes in the peel tissue, such as destruction of the green chlorophyll pigments and accumulation of orange/yellow carotenoids. Nonetheless, it is not yet known whether exogenous ethylene affects internal ripening processes in citrus flesh. To address this question, we examined the possible effects of ethylene on taste, aroma, perceived flavor, and nutritional quality of various citrus fruit, including 'Navel' oranges, 'Star Ruby' grapefruit and 'Satsuma' mandarins. Exposure to ethylene enhanced peel color break, and respiration and ethylene production rates in all citrus fruit tested. However, ethylene degreening had no effect on juice total soluble solids and acid contents, and had only minor effects on contents and composition of juice aroma volatiles. Moreover, sensory analysis tests revealed that ethylene degreening did not affect the flavor of oranges and grapefruit, but marginally impaired sensory acceptability of mandarins; the latter change could be attributed, at least partially, to storage of the fruit for 5 days at 20 °C. Nevertheless, ethylene degreening did not enhance off-flavor perception or accumulation of off-flavor volatiles, nor had any effect on levels of health promoting compounds such as vitamin C, total phenols and flavonoids, or antioxidant-activity of citrus juice. We conclude that although ethylene affects peel color break, it is probably not involved in regulation of internal ripening processes in citrus fruit and, therefore, does not impair internal fruit quality.