Title Transcriptomic changes asociated with postharvest susceptibility of an Aba-deficient mutant of oranges to Non-chilling peel pitting

Author Paco Romero, María J. Rodrigo, Fernando Alférez, José Gadea, Lorenzo Zacarías and María T. Lafuente

Citation Abstracts Book, 6th International Postharvest symposium, 8-12 April 2009, Antalya, Turkey. 256 pages.

Keyword Abscisic acid; orange; storage

Abstract

'Pinalate' orange fruit is a spontaneous abscisic acid (ABA) deficient mutant from the Navel orange (cv. 'Navelate'), which produces distinctive yellow-colored fruit instead of typical orange color. Fruit of this mutant are very prone to dehydration and much more susceptible to develop non-chilling peel pitting than fruit of its parental 'Navelate'. Therefore, 'Pinalate' mature fruit is a valuable experimental system to address transcriptomic studies aimed to understand the molecular basis of the tolerance of citrus fruit to this physiological disorder and to analyze the potential role of ABA and dehydration in the incidence of the disorder. We have evaluated changes in peel damage development, ABA levels and global changes in gene expression occurring the outer part of the peel (flavedo) of 'Pinalate' and 'Navelate' fruit stored at 12°C. ABA content in the flavedo of the mutant fruit was about 10-fold lower during the whole storage period, while the development of peel damage and the rate of dehydration were higher. Peel pitting was already evident by one week storage in 'Pinalate' fruits, which showed a peel damage index similar to that of 'Navelate' oranges stored for six weeks at the same temperature. Global changes in gene expression in the flavedo of 'Pinalate' and 'Navelate' fruit stored at 12°C were evaluated by using a cDNA microarray containing 20000 unigenes generated by the Spanish 'Citrus Functional Genomics Project'. Major changes in the number of differentially expressed genes occurred by one week of storage in 'Navelate' fruits as compared to freshly harvested fruit, being the number of up-regulated genes (1182) lower than that of the down-regulated genes (1987). By this period, all the genes showing differential expression (483) were down-regulated in 'Pinalate' fruits. Gene ontology analysis revealed that the biological processes related to defense response, stress, wounding and biotic and abiotic stimulus were repressed in both cultivars by one week storage, while water deprivation and inorganic cation transport processes were induced in 'Navelate' fruit. The results also showed that biological processes related to cell-wall metabolism, carbohydrate biosynthesis and response to light stimulus were repressed by 3 weeks in the ABA-deficient mutant.