

Title Climacteric fruit ripening: Ethylene-dependent and independent regulation of ripening pathways in melon fruit

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Abstract

Cantaloupe melons have a typical climacteric behaviour with ethylene playing a major role in the regulation of the ripening process and affecting the ripening rate. Crossing of Cantaloupe Charentais melon with a non-climacteric melon indicated that the climacteric character is genetically dominant and conferred by two duplicated loci only. However, other experiments made by crossing two non-climacteric melons have generated climacteric fruit, indicating that different and complex genetic regulation exists for the climacteric character. Suppression of ethylene production by antisense ACC oxidase RNA in Charentais melon has shown that, while many ripening pathways were regulated by ethylene (synthesis of aroma volatiles, respiratory climacteric and degreening of the rind), some were ethylene-independent (initiation of climacteric, sugar accumulation, loss of acidity and coloration of the pulp). Softening of the flesh comprised both ethylene-dependent and independent components that were correlated with differential regulation of cell wall degrading genes. These results indicate that climacteric (ethylene-dependent) and non-climacteric (ethylene-independent) regulation coexist during climacteric fruit ripening. In addition, ethylene-suppressed melons allowed demonstrating that the various ethylene-dependent events exhibited differential sensitivity to ethylene and that ethylene was promoting sensitivity to chilling injury. Throughout this review, the data generated with melon are compared with those obtained with tomato and other fruit.