Chilling injury in pineapple fruit is related to mitochondrial antioxidative metabolism

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Abstract

Mitochondrial fatty acid composition and mitochondrial antioxidative metabolism were studied in relation to chilling injury (CI) in the fruit pulp of two pineapple (*Ananas comosus*) cultivars: Pattavia (a tolerant cultivar) and Trad-See-Thong (a susceptible cultivar) which were stored at 10 °C for 14 d. CI symptoms, mainly water soaking, were only found in the susceptible cultivar Trad-See-Thong. Only small differences in the ratio of saturated to unsaturated fatty acids were determined between mitochondria of the two cultivars. Mitochondrial superoxide dismutase, catalase, and ascorbate peroxidase activities were all lower in the susceptible cultivar. Mitochondrial total antioxidant capacity, determined by the FRAP and the ABTS methods, was lower in the susceptible cultivar and mitochondrial dysfunction, determined by the absence of an increase in respiration after ADP addition, was also more prominent in the susceptible cultivar. Mitochondria of Trad-See-Thong were also less tolerant to treatment with exogenous hydrogen peroxide. It is concluded that the impaired functioning of mitochondria in pulp cells of Trad-See-Thong fruit stored at 10 °C, and its higher sensitivity to damage by ROS, is likely due to its lower total antioxidant capacity and lower activities of antioxidative enzymes. A higher sensitivity to ROS-induced mitochondrial dysfunction was apparently the cause of the increased CI levels in the pulp of chilled Trad-See-Thong fruit.