

Title Alleviation of chilling injury in tropical and subtropical fruits
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Abstract

Chilling injury in tropical and subtropical fruits can be alleviated by low temperature preconditioning, intermittent warming, heat treatment, controlled atmosphere storage, treatments with calcium or other chemicals, waxing, film packaging, genetic modification, or applications with ethylene, abscisic acid, polyamines, methyl jasmonate, methyl salicylate, or other natural compounds. The effectiveness of each treatment varies with the commodity, the maturity of the fruit, and the dosage of the treatment. Low temperature conditioning and intermittent warming maintain high levels of phospholipids, increase the degree of unsaturation of fatty acids, increase the levels of spermidine and spermine, and stimulate the activities of free radical scavenging enzymes. Heat treatment induces heat shock proteins (HSP), suppresses oxidative activity, and maintains membrane stability. Methyl jasmonate and methyl salicylate stimulates the synthesis of some stress proteins, such as HSP, pathogenesis-related (PR)-proteins, and alternative oxidase (AOX) and can activate lipoxygenase gene expression and induce synthesis of abscisic acid and polyamines. Polyamines may act as free radical scavengers and membrane stabilizers. All of these processes can enhance chilling tolerance of tissues and alleviate chilling injury of tropical and subtropical fruits.