Title Effect of pure oxygen atmosphere on antioxidant enzyme and antioxidant activity of harvested litchi fruit during storage

Author Xuewu Duan, Ting Liu, Dandan Zhang, Xinguo Su, Hetong Lin and Yueming Jiang

Citation Food Research International, Volume 44, Issue 7, August 2011, Pages 1905-1911

Keywords High oxygen; Litchi fruit; Pericarp browning; Antioxidant

Abstract

The effects of pure oxygen on pericarp browning, reactive oxygen species (ROS) metabolism, antioxidant enzyme and antioxidant activity of harvested litchi fruit were investigated. Application of pure oxygen significantly prevented pericarp browning and delayed the increase in membrane permeability of litchi fruit during storage. Litchi fruit exposed to pure oxygen showed a lower level of lipid peroxides, compared to control fruit, with the delay in the increases of both H_2O_2 content and superoxide production rate. Furthermore, it was found that the treatment with pure oxygen induced the activities of superoxide dismutase (SOD), ascorbated peroxidase (APX) and catalase (CAT), which could be beneficial in scavenging of H_2O_2 and superoxide and alleviating lipid peroxidation. In addition, antioxidant ability (reducing power and free-radical scavenging activity against DPPH radical, superoxide anions and hydroxyl radical) of methanol extracts from litchi fruit pericarp declined gradually, with decreasing contents of anthocyanins and phenolic compounds, as storage time of the fruit progressed. There was a linear relationship between the contents of either anthocyanins or phenolic compounds and antioxidant ability or free radical scavenging activity. Treatment with pure oxygen markedly increased antioxidant ability, which was related to higher levels of anthocyanins and phenolic compounds, compared with those of control fruit. It is suggested that enhanced antioxidant activity and antioxidant enzyme induced by pure oxygen may contribute to alleviating lipid peroxidation and maintenance of membrane integrity, which reduced decompartmentation of enzymes and substrates, resulting in enzymatic browning.