Near freezing point storage compared with conventional low temperature storage on apricot fruit flavor quality (volatile, sugar, organic acid) promotion during storage and related shelf life

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Abstract

Sugars, acids, and aroma volatiles are essential flavor components of fruit; the fatty acid metabolic pathway is regarded as key to formation of fruit aroma compounds. In this study, we investigated the comparative influence of different storage temperatures on apricot flavor compounds during shelf storage using the Shushanggan apricot (*Prunus armeniaca* L. 'Shushanggan'), which is rich in sugars, acids, and aroma volatiles. Three low temperature storage conditions, namely 10 °C, 5 °C, and near freezing point storage (NFPT), were compared and ethylene production and the content of three sugars, two acids, four "green" aroma volatiles, and six "fruity" aroma volatiles were determined; in addition, the activity of aroma related enzymes in the fatty acid metabolic pathway were investigated. In general, the content of the three sugars (fructose, glucose and sucrose) and the two acids (citric acid and malic acid) were not significantly affected by temperature. In contrast, compared with the control, the "green" and "fruity" aroma volatiles were reduced to varying degrees at the three low temperature storage conditions. However, at the medium storage stage, the "green" and "fruity" aroma volatiles could recover to normal levels, whereas at the terminal stage of storage the volatile recovery showed an unresponsive result. In fruit stored at near freezing point, aroma volatiles recovered in content; however, irreversible reduction in the nine aroma volatiles occurred at 5 °C storage. With regard to activities of enzymes in the fatty acid pathway, lipoxygenase activity was not affected by temperature but hydroperoxide lyase, alcohol dehydrogenase, and alcohol acyltransferase showed clear inhibition at 5 °C storage. The changes in volatile compounds were closely related to apricot fruit maturation manifested in color changes and production of

ethylene. The results presented here indicate that after prolonged storage at low temperature, flavor loss was mostly related to effects on aroma volatiles rather than on sugars or acids. NFPT storage was found to be the most effective way to maintain the flavor and shelf storage of apricot fruit after storage.