

Title Maturity stage at harvest affects volatile compounds emission and acceptability of Fuji apples stored under ultra-low oxygen atmosphere

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Abstract

A common technology to preserve apples is controlled atmosphere (CA). This technology permits a good preservation of flesh firmness and epidermis colour in fruit, but has the drawback of decreasing the emission of volatile compounds, especially under storage atmospheres with ultra-low oxygen concentrations (ULO). Several techniques have been tested to regenerate the volatiles after fruit removal from storage, but the simplest one for a routine use at the packinghouses is the application of an additional period under cold air after ULO storage. The purpose of this work was to assess whether maturity stage at harvest affects the emission of volatile compounds, quality parameters and consumer acceptability after ULO storage of 'Fuji kiku 8' apples. Fruit were harvested after 182 dafb (H1) and 193 dafb (H2), and were stored at 1 °C and 93 % RH in 1% O₂ + 1 % CO₂. A lot of ULO-stored fruit remained under this atmosphere for 19 or 30 weeks (ULO), a second lot was kept during 17 or 28 weeks in ULO followed by 2 weeks in air (ULO+2w), and a third batch of fruit was maintained 15 or 26 weeks in ULO followed by 4 weeks in air (ULO+4w). After storage, volatile compounds emission, quality parameters and consumer acceptability were analyzed after 7 days at 20°C subsequent to removal from storage. At harvest, fruit at a more advanced maturity stage had higher starch index values and soluble solids content, and more yellowish epidermis colour. After storage, in general, no differences were found between both harvest dates, and values of quality parameters were kept above those recommended for commercial purposes. In relation to the volatile compounds that contribute most to 'Fuji' flavour (ethyl 2-methylbutanoate, hexyl acetate, ethyl butanoate and 2-methylbutyl acetate), H1 fruits presented higher production of straight-chain esters, while H2 fruits showed more emission of esters of the branched-chain type. Moreover, ULO+4w treatment led to the highest amount of these main compounds for both harvest dates. In general, and also for both harvest dates, fruit stored under ULO+2w and ULO+4w obtained higher scores for acceptability than ULO-stored fruits, especially after 19 weeks of storage.