

# Dynamic changes of antioxidants and fermentative metabolites in apple peel in relation to storage, controlled atmosphere, and initial low oxygen stress

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## Abstract

Storage of apples (*Malus × domestica*, Borkh.) in controlled atmosphere (CA) and/or the application of initial low oxygen stress (ILOS) are very effective in controlling postharvest disorders as bitter pit and superficial scald. This work aims to evaluate the effect of CA-storage and ILOS on the stress-related compounds of apple peel and to deepen the knowledge about the possible role of the antioxidant defense system against postharvest disorders. Fermentative metabolites, ascorbate (ASA), glutathione (GSH), total ascorbate (T-ASA) and total glutathione (T-GSH), ethylene,  $\alpha$ -farnesene, conjugated trienols (CTols), as well as standard maturity indices, were monitored on the peel of apples (cv Red Chief) subjected or not to ILOS and stored 120 days in air or CA. CA-storage caused a reduction of conjugated trienols and ethylene production in Red Chief fruit compared to storage in air. ILOS induced an increase in the production of fermentative metabolites, especially when coupled with CA-storage, but the observed increase in ethanol concentration did not affect ethylene production. ILOS pretreatment and CA-storage induced higher T-GSH and GSH content in the peel of Red Chief fruit. In particular, ILOS caused a temporary shift of GSH towards its oxidated form, which finally resulted in an induction of GSH biosynthesis. Given the positive effect of ILOS on the GSH and T-GSH content, we hypothesize that the peel antioxidant compounds might play some role in the protection against postharvest disorders.