

Title Influence of high carbon dioxide and low oxygen on the postharvest physiology of fresh truffles

Author Shadi Elias Hajjar, Riccardo Massantini, Rinaldo Botondi, Panagiotis Kefalas and Fabio Mencarelli

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Abstract

Truffles are one of the most prized of foods but also one of the most perishable. Storing fresh truffles entails the use of low temperatures and the addition of carbon dioxide, but the effect of carbon dioxide on truffle metabolism is largely unknown. Treatment with 50% CO₂ + 5% O₂ at 2 °C for 29 d caused a reduction in polyphenol contents and antioxidant activity compared to the controls (air treatment). ADH (alcohol dehydrogenase) and LDH (lactate dehydrogenase) activities in CO₂-treated samples decreased together with the related metabolites, ethanol and lactic acid, but on day 29 (final sampling) they increased again, reaching the initial levels but still below the concentrations of air-treated samples. Polyamine contents decreased initially in CO₂-treated samples more than in air-treated truffles but at the final sampling increased significantly (1.5–2.3-fold). In summary, polyphenol metabolism, anaerobic pathways, and polyamine biosynthesis are reduced by high CO₂ and low O₂ atmospheres, suggesting reduced general cell metabolic activity associated with reduced senescent activity, or stress effects. The rapid increase of polyamines and anaerobic metabolism could be an index of the reaction to stress only at the end of storage, and the increase in polyamines could provide protection against pathogen attack.