Title Physiological implications of controlled atmosphere storage of 'Conference' pears (*Pyrus communis* L.): A proteomic approach

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Abstract

Two-dimensional electrophoresis (2-DE) coupled to a robust statistical approach comprising univariate and multivariate statistics and LC–ESI-MS/MS protein identification was used to improve the understanding of the physiology of pears submitted to four different controlled atmosphere (CA) conditions. Optimal commercial CA conditions (2.5% O_2, 0.7% CO_2, with pre-cooling and fruit from the optimal harvest date), browning-inducing CA conditions (1% O_2, 10% CO_2, using no pre-cooling and fruit from a late harvest) and two intermediate CA conditions (2.5% O_2, 10% CO_2 and 15% O_2, 0.6% CO_2, both including pre-cooling and fruit from the optimal harvest date) were evaluated. The combination of oxygen and carbon dioxide concentrations, pre-cooling period and harvest time plays a key role in core breakdown presumably in the protein levels during controlled atmosphere storage of pears. Our results show that impaired respiration is highly related to protein synthesis alterations, and activation of defense mechanisms. Triosephosphate isomerase, a key enzyme of the energy metabolism was up-regulated under browning-inducing conditions in an attempt to use alternative more efficient anaplerotic pathways to cope with the applied stresses. The changes in the accumulation of proteins related to ethylene biosynthesis (ACC oxidase) and allergens (major allergen Pyrc 1) were highly dependent on the oxygen and carbon dioxide concentrations. ACC oxidase and the major allergen Pyrc 1 were clearly down-regulated under low oxygen or high carbon dioxide concentrations. Their involvement in metabolic disturbances cannot be discarded.