

Title Influence of harvest time and 1-MCP application on postharvest ripening and ethylene biosynthesis of 'Jonagold' apple

Author I. Bulens, B. Van de Poel, M.L.A.T.M. Hertog, M.P. De Proft, A.H. Geeraerd and B.M. Nicolai

Citation Postharvest Biology and Technology. Volume 72, October 2012, Pages 11–19

Keywords Jonagold; *Malus × domestica*; Ethylene; Firmness; Respiration; Controlled atmosphere

Abstract

Changes in ethylene biosynthesis, respiration and firmness were studied during on-tree ripening, controlled atmosphere (CA) storage and shelf-life of 'Jonagold' apples. Particular attention was paid to the influence of harvest time on subsequent ripening during CA storage and shelf-life and on the effect of treatment with the ethylene inhibitor 1-MCP. The influence of harvest time was most prominent on firmness, with late harvested apples being significantly softer throughout the whole postharvest life. Respiration rate was mainly influenced by the surrounding temperature and air conditions and to a lesser extent by the harvest time. Ethylene production rate depended on harvest time straight after harvest and during storage but this effect disappeared upon movement from storage to shelf-life. When apples were treated with 1-MCP, ethylene biosynthesis was almost completely suppressed throughout the whole postharvest life, with exception of the late harvested apples which regained some ethylene forming capacity after two weeks of shelf-life. A detailed overview of ethylene biosynthesis including the often neglected metabolite S-adenosyl-l-methionine (SAM) was generated. The changes in SAM concentration could not directly be linked to the changes in ethylene production rate as such and SAM was not a limiting factor in apple ethylene biosynthesis during ripening. *In vitro* 1-aminocyclopropane-1-carboxylate synthase (ACS) and oxidase (ACO) activities were differently affected by CA storage conditions with ACS being the most dominant controlling factor in the biosynthesis of ethylene.