



Contents lists available at ScienceDirect

Plant Physiology and Biochemistry

journal homepage: www.elsevier.com/locate/plaphy

Research article

Metabolomic and physico-chemical approach unravel dynamic regulation of calcium in sweet cherry fruit physiology



Michail Michailidis, Evangelos Karagiannis, Georgia Tanou, Katerina Karamanoli, Athina Lazaridou, Theodora Matsi, Athanassios Molassiotis*

Department of Agriculture, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece

ARTICLE INFO

Article history:

Received 5 April 2017

Received in revised form

11 May 2017

Accepted 15 May 2017

Available online 17 May 2017

Keywords:

Calcium

Fruit quality

Metabolomics

Physiological disorders

Post-harvest physiology

Pre-harvest physiology

Sweet cherry

ABSTRACT

Calcium (Ca^{2+}) nutrition has a significant role in fruit physiology; however, the underlying mechanism is still unclear. In this study, fruit quality in response to CaCl_2 , applied via foliar sprays (Ca^{2+}) or/and hydro-cooling water (Ca_{HC}), was characterized in ‘Lapins’ cherries at harvest, just after cold storage (20 days at 0°C) as well as after cold storage followed by 2 days at 20°C , herein defined as shelf-life period. Data indicated that pre- and post-harvest Ca^{2+} applications increased total Ca^{2+} and cell wall bound Ca^{2+} , respectively. Treatment with Ca reduced cracking whereas Ca + Ca_{HC} condition depressed stem browning. Both skin penetration and stem removal were affected by Ca^{2+} feeding. Also, several color- and antioxidant-related parameters were induced by Ca^{2+} treatments. Metabolomic analysis revealed significant alterations in primary metabolites among the Ca^{2+} treatments, including sugars (eg., glucose, fructose), soluble alcohols (eg., arabitol, sorbitol), organic acids (eg., malate, quinate) and amino acids (eg., glycine, beta-alanine). This work helps to improve our knowledge on the fruit's response to Ca^{2+} nutrition.