Adjustments of both phospholipids and sphingolipids contribute to cold tolerance in stony hard peach fruit by continuous ethylene

Shuqi Chen, Mengshuang Chen, Yali Li, Xin Huang, Dequan Niu, Arif Rashid, Changjie Xu and Ke Wang

Postharvest Biology and Technology, Volume 171, January 2021, 111332

Abstract

Horticultural products, including peaches, are susceptible to chilling injury (CI), on which the effect of ethylene is still controversial, and the underlying mechanism remains elusive. Here, changes in biochemical and molecular mechanisms involved in phenolic and lipid metabolism were compared between stony hard peaches with continuous ethylene (CETH) and controls. CETH effectively compromised internal browning incidence, accompanied by the inhibited activity of peroxidase but enhanced phenolic content, and less membrane leakage with reduced H_2O_2 and malondialdehyde contents. Intriguingly, CETH elevated levels of phospholipids and unsaturation of their acyl chains, coincident with the lower transcript levels of *phospholipase Dα1* but higher *fatty acid desaturase2/8.1*, and the enhanced sphingolipid contents and biosynthesis concomitant with higher transcript levels of *glucosylceramide synthase* but lower *inositol phosphorylceramide synthase3*. Therefore, CETH can ameliorate fruit CI through adjusting phenolic and lipid metabolism, especially comprehensive remodeling of phospholipids and sphingolipids to contribute to the membrane stability.