

Exogenous melatonin alleviated chilling injury in harvested plum fruit *via* affecting the levels of polyamines conjugated to plasma membrane

Hongyang Du, Guting Liu, Congmin Hua, Dongxiao Liu, Yingying He, Huaipan Liu,
Ronald Kurtenbach and Dongtao Ren

Postharvest Biology and Technology, Volume 179, September 2021, 111585

Abstract

Polyamines (PAs) are related closely with many abiotic stresses. However, conjugated PA functions are not clear in alleviating chilling injury in fruit. The contents of free PAs in plum flesh cell and conjugated PAs in plasma membrane (PM), the activities of *S*-adenosylmethionine decarboxylase (SAMDC) and transglutaminase (TGase), and the degree of chilling injury were investigated in harvested plum (*Prunus salicina* L.) fruit pre-treated with exogenous melatonin. Chilling treatment resulted in the injury of plasma membrane (PM), as judged by the increased PM permeability, chilling injury index and malondialdehyde (MDA) content, and the decreased sulfhydryl group contents. Exogenous melatonin alleviated chilling injury, in parallel with the increased levels of free spermidine (Spd) and spermine (Spm) in cell, conjugated non-covalently (CNC) Spd and Spm, and conjugated covalently (CC) Put and Spd in PM, resulting from the increased activities of SAMDC and TGase. The results of the additional experiments with two inhibitors, methylglyoxyl-bis (guanylhydrazone) (MGBG) and phenanthroline, which inhibit the activities of SAMDC and TGase, respectively, were complementary evidences for our research. MGBG and TGase treatment decreased the level of CNC PAs (Spd and Spm) and CC PAs (Put and Spd), respectively, coupled with aggravating the chilling injury. From these above mentioned results, it could be suggested that exogenous melatonin alleviated chilling injury by elevating the levels of CNC Spd, CNC Spm, CC Put and CC Spd in PM.