The roles of *SlMYC2* in regulating ascorbate-glutathione cycle mediated by methyl jasmonate in postharvest tomato fruits under cold stress

Zilong Li, Dedong Min, Xiaodong Fu, Xiuming Zhao, Jihan Wang, Xinhua Zhang, Fujun Li and Xiaoan Li

Scientia Horticulturae 288: 110406. (2021)

Abstract

This study parsed the mechanism of *SlMYC2* involving methyl jasmonate (MeJA)-mediated tomato fruit chilling tolerance. The data indicated that the application of MeJA significantly prevented chilling injury (CI) and inhibited the accumulation of hydrogen peroxide (H_2O_2) and superoxide anions ($O_2^{\bullet-}$) in tomato fruit during cold storage. The accumulation of endogenous ascorbate (AsA) and glutathione (GSH) contents in fruit were enhanced by MeJA treatment resulting from increasing activities of enzymes related to AsA-GSH cycle. Meanwhile, the MeJA-treated fruit exhibited significantly higher expression levels of C-repeat-binding factor 1 (*SlCBF1*), cold regulated gene (*SlCOR413*) and inducer of *SlCBF* expression (*SlICE1* and *SlICEa*), which belong to the SlICE-SlCBF-SlCOR (ICC) signaling pathway. However, the effects of MeJA were inhibited by the silence of *SlMYC2*. The expression levels of *SlCBF1, SlCOR413, SlICE1* and *SlICEa* were reduced in *SlMYC2*-silenced fruits, and there was no significant difference in CI index and the indexes related to AsA-GSH cycle between (SlMYC2-silenced+MeJA)-treated fruit and control during most storage periods. In addition, correlation analysis indicated that the indexes involved in AsA-GSH cycle and ICC signaling pathway were closely related to the transcription of SlMYC2. Therefore, these results illustrated that *SlMYC2* was involved in the regulation of ASA-GSH cycle and ICC signaling pathway mediated by MeJA during the cold tolerance of tomato fruit.