

Chitosan inhibits postharvest berry abscission of 'Kyoho' table grapes by affecting the structure of abscission zone, cell wall degrading enzymes and SO₂ permeation

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Postharvest Biology and Technology, Volume 176, June 2021, 111507

Abstract

SO₂ treatment is currently the preferred method for postharvest preservation of table grapes, while inappropriate amount of environmental SO₂ would render kinds of physiological damage, including tissues bleaching, flavor destroying and berry abscission. Our previous study has reported that 1.5% chitosan solution treatment could inhibit postharvest berry abscission of the 'Kyoho' table grapes, especially caused by excessive SO₂ treatment. However, the physiological mechanism of chitosan inhibiting SO₂-induced berry abscission still remains unclear. This study further focused on physiological changes of the abscission zone (AZ) between stalk and pedicle, including fruit detachment force (FDF), the microscopic structure, cell wall degrading enzymes and SO₂ permeation, during storage of the 'Kyoho' table grapes with different postharvest treatments. The results showed that the 1.5% chitosan treatment remarkably suppressed the decrease of FDF, and delayed the structural deterioration in AZ during storage. Meanwhile, this chitosan treatment also distinctly suppressed the increase of cell wall degrading enzymes activity and SO₂ permeation into AZ, which showed statistically linear relationship with abscission index. Those results contribute to elucidate the physiological mechanism of chitosan-inhibited berry abscission and develop new preservation technology with greater commercial value for postharvest table grapes in the future.