

Physiological and metabolomic analyses of hot water treatment on amino acids and phenolic metabolisms in peach cold tolerance

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Postharvest Biology and Technology, Volume 179, September 2021, 111593

Abstract

Hot water (HW) treatment is useful to reduce chilling injury (CI) in several kinds of fruit including peach. However, the systemic regulatory mechanisms remained unknown. Physiological, metabolomic and transcriptomic analyses were applied in this study to reveal amino acids and phenolic metabolisms in HW-treated peaches. Results showed that reduced CI and malondialdehyde (MDA) content were accompanied with higher levels of amino acids, phenolic compounds and their derivatives contents such as arginine, proline, γ -aminobutyric acid (GABA), polyamines (PAs), chlorogenic acid, kaempferol and quercetin in HW treatment compared to control. The activities of these metabolism-related enzymes were significantly enhanced by HW. In addition, transcriptomic and metabolomic evaluation indicated that HW treatment activated the biosynthesis of amino acids and phenolic, and suppressed the degradation of amino acids. Thus, the present results suggested that HW treatment could enhance chilling tolerance of peaches by regulating phenolic and amino acids metabolisms, maintaining high levels of phenolic and amino acids contents, which contributed to enhancing antioxidant capacity and alleviating membrane injury during cold storage.