

Pre-storage hot water treatment enhances chilling tolerance of zucchini (*Cucurbita pepo* L.) squash by regulating arginine metabolism

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Abstract

The effect of hot water (HW) treatment on chilling injury (CI), arginine metabolism, enzymes activity and related gene expressions of zucchini squashes were investigated during cold storage. Immature zucchini fruit were treated with hot water at 45 ± 1 °C for 15 min and then stored at 4 ± 1 °C and above 90 % relative humidity for 15 d. Another batch immersed in distilled water at 25 °C for 15 min served as control. The results revealed that HW treatment significantly reduced the development of CI during storage. The activity of arginase, arginine decarboxylase (ADC) and ornithine decarboxylase (ODC) enzymes were increased leading to higher accumulation of polyamines. Similarly, the proline contents were also increased due to increased activity of Δ^1 -pyrroline-5-carboxylate synthetase (P5CS) and ornithine d-aminotransferase (OAT) enzymes. The expression of genes under study also responded accordingly with relatively higher expression level compared with control. Moreover, the activity and gene expression of proline dehydrogenase (PDH) enzyme was lower in tissues of HW treated zucchini fruit. Thus, HW treatment induced the arginine metabolism, resulting in accumulation of polyamines and proline, which subsequently increased the chilling tolerance.