Analysis of transcriptome and phytohormone profiles reveal novel insight into ginger (*Zingiber officinale* Rose) in response to postharvest dehydration stress

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Abstract

Dehydration stress is one of the severe postharvest problems of ginger. To better understand the molecular regulatory mechanism in ginger in response to postharvest dehydration stress, RNA-seq and phytohormone profiles analysis were performed in ginger rhizomes after 0 h, 2 h, 12 h, 24 h of postharvest water stress (with loss of 0 %, 1.7 %, 4.7 %, and 9.4 % of initial weight), respectively. The results indicated that postharvest dehydration stress contributes significantly to a loss of nutritious quality and storability in ginger rhizomes. Both the levels of abscisic acid (ABA) and salicylic acid (SA) markedly increased, however, auxin (indol-acetic acid, IAA), cytokinin (*tans*-zeatin, *t*Z), and gibberellin (GA_1 and GA_3) significantly decreased in ginger rhizomes under dehydration stress. Transcriptome analysis revealed a total of 1415, 2726, and 6641 genes were differently expressed after 2 h, 12 h, and 24 h of water-loss stress treatment compared with that in 0 h of ginger rhizomes, respectively. Additionally, 518 DEGs share similar expression patterns during 24 h of dehydration stress. These genes are mainly enriched in plant hormone signaling, phenylpropanoid biosynthesis, phenylalanine metabolism, fatty acid elongation, starch and sugar metabolism, and carotenoid biosynthesis. In addition, expression levels of MYB genes sharply increased in ginger rhizomes in response to water loss, which may function in regulation of lignin biosynthesis. These findings suggest that postharvest dehydration tolerance of ginger rhizomes may be mainly related to antagonistic regulation of endogenous phytohormones biosynthetic pathway and signaling, MYB transcription factors mediated lignin metabolism, antioxidant enzyme regulatory oxidative balance, and maintenance of energy supply. Our results provide new insights into molecular mechanism of ginger in response to postharvest dehydration which are of agricultural importance.