

Ripening responses, fruit quality and phospholipase D gene expression in bell peppers exposed to hexanal vapor

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Abstract

Phospholipase D (PLD) is a key enzyme involved in membrane lipid catabolism. Hexanal, a C₆ volatile aldehyde is a strong PLD -inhibitor, and has been observed to enhance the shelf life and quality of horticultural produce. In the present study, the effect of hexanal vapor exposure on the postharvest quality and ripening response of bell pepper fruit was evaluated. Hexanal exposure for a minimum of 6 h was found to be essential to delay ripening in bell pepper fruit. Quantification of head space hexanal levels in the presence of pepper fruit revealed a gradual decrease in concentration, while it remained relatively steady close to the peak value in the absence of pepper fruit. Hexanal treated bell peppers subjected to 21 d of postharvest storage evolved higher levels of aroma volatiles than untreated peppers. Hexanal vapor treatment induced significant alterations in the transcript accumulation and expression of genes involved in the carotenoid biosynthetic pathway, antioxidant enzyme systems, and the LOX pathway in stored pepper fruit. Real time PCR analysis also confirmed the near-complete downregulation of expression of genes encoding PLD α , β , δ and ζ isoforms in hexanal vapor treated peppers. The results suggest that hexanal vapor treatment can beneficially influence the expression of genes in multiple biochemical pathways, which could ultimately result in enhancing the shelf life and quality of horticultural produce.