

UV-C irradiation delays the physiological changes of bell pepper fruit during storage

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Abstract

Bell pepper is a model for studying the ripening process of non-climacteric fleshy fruit, during which numerous physiological changes occur. UV-C irradiation is an abiotic stress, which has an important influence on plant growth, development and ripening. We explored the influences of UV-C irradiation on physiological changes in bell pepper fruit during postharvest storage by measuring sensory quality, firmness and mass loss, and the underlying changes at the molecular level by combined transcriptome and metabolome analysis. Effects were detected on transcripts for numerous critical enzymes involved in fruit pigment accumulation, fruit texture change, fruit flavor and aroma production. Moreover, transcripts for several key enzymes and transcription factors involved in plant hormone pathways and their corresponding noncoding RNAs were identified and differential expression profiles were also analyzed. Components of a competing endogenous RNAs (ceRNA) regulatory network changed in response to UV-C irradiation and the relationships between them was analyzed. Thirty-one differentially expressed metabolites were identified. Combined transcriptome and metabolome analysis showed that the genes and metabolites that responded to UV-C were mainly involved in flavonoid, phenylalanine, tyrosine, tryptophan and phenylpropanoid biosynthesis. This study provides insights into bell pepper fruit physiology and the effects of UV-C irradiation on postharvest quality and enhances our understanding of the underlying mechanism whereby UV-C delays postharvest physiological changes in bell pepper fruit.