Title Differential expression within the LOX gene family in ripening kiwifruit

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Abstract

Real-time quantitative PCR was used to study lipoxygenase (LOX) gene expression patterns in kiwifruit (*Actinidia deliciosa* [A. Chev.] C.F. Liang et A.R. *Ferguson* var. *deliciosa* cv. Hayward) during fruit ripening, and in response to ethylene and low temperature during post-harvest storage. Six LOX genes were identified and cloned from a kiwifruit EST database. All were expressed in vegetative tissues and in the fruit. Expression of AdLox1 and AdLox5 increased markedly as fruit developed to the climacteric stage and were up-regulated by ethylene treatment, following a similar pattern to LOX enzyme activity. By contrast, AdLox2, AdLox3, and AdLox4 transcripts were negatively associated with ethylene accumulation, and ethylene application enhanced the decline in transcript levels. Transcripts of AdLox6 declined with fruit ripening. The fruit showed no ripening changes at low temperature, where transcripts of AdLox1 and AdLox6 were slightly induced about 72 h after harvest, suggesting an adaptive response to low temperature. Transient expression of the ethylene-responsive AdLox1 gene in tobacco leaves led to significant degradation of chlorophyll and promoted tissue senescence, whereas AdLox2 had no such effect. The results showed that the six LOX genes were differentially regulated during kiwifruit ripening and senescence, forming two groups, one active in ripening and responsive to ethylene and the other more constitutively expressed. The possible roles of individual LOX isoforms in kiwifruit are discussed.