

**Title** Expression of 1-aminocyclopropane-1-carboxylate synthase and 1-aminocyclopropane-1-carboxylate oxidase genes during ripening in "Rendaiji" persimmon [*Diospyros kaki*] fruit

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### Abstract

'Rendaiji' persimmon (*Diospyros kaki* Thunb.) is a pollination variant astringent type persimmon that is characterized by low levels of the ethylene production rate during ripening. However, a serious problem in postharvest handling is that mature fruits soften quite rapidly accompanied with increased ethylene production after treatments to remove astringency. In this study, we investigated changes in ethylene biosynthesis, by following the accumulation of 1-aminocyclopropane-1-carboxylic acid (ACC) and 1-(malonylamino)-cyclopropane-1-carboxylic acid (MACC), as well as ACC synthase (ACS) and ACC oxidase (ACO) activities and the expression of their respective genes in relation to the process and mechanism of fruit ripening. The response by persimmon fruits to 1-methylcyclopropene (1-MCP) treatments during postharvest ripening was also studied. Ripening was accompanied by relatively low levels of the ethylene production rate, concomitant with a decrease in firmness, especially after exposure to a deastringency treatment by using ethanol vapor. Postharvest application of 1-MCP, on the other hand, did not suppress ethylene production rates to the expected level, but it lowered the accumulation of ACC and the activities of ACC synthase and ACC oxidase. However, the degree of inhibition was higher in ACC synthase, which would imply that the step catalyzed by this enzyme is more subject to regulation by ethylene in this fruit. Comparing gene expression patterns in control and 1-MCP treated fruit by using quantitative RT (Real-Time)-PCR showed that ethylene biosynthesis associated with rapid ripening in 'Rendaiji' was accompanied by the expression of DK-ACS1, DK-ACS2, DK-ACO1, and DK-ACO2 genes. The expression of DK-ACS3, however, was not induced.