

Effects of ethylene and 1-methylcyclopropene treatments on physiological changes and ripening-related gene expression of ‘Mopan’ persimmon fruit during storage

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Postharvest Biology and Technology, Volume 166, August 2020, 111185

Abstract

‘Mopan’ persimmon (*Diospyros kaki* L. cv. Mopan) is an economically important persimmon cultivar that is widely grown in northern China areas. Expanded understanding of postharvest fruit physiological changes and the role that ethylene plays will enhance the efficiency of fruit storage and marketing. Treatments with ethylene and 1-MCP on ‘Mopan’ persimmons showed opposite effects on softening, color, total soluble solid (TSS), total and soluble tannin contents, ethylene production and respiration rate during fruit storage. Ethylene and 1-MCP treatments also affected the expression of five ethylene signaling genes *DkCTR1*, *DkETR1*, *DkETR2*, *DKERF22* and *DKERF19*, three de-astringent related genes *DkADH1*, *DkPDC1* and *DkPDC2*, and four cell wall-hydrolyzing enzyme genes *DkPG1*, *DkXTH2*, *DkPME1* and *Dkβ-GAL1* during fruit storage. High correlations were observed between ethylene signal pathway genes, physiological characters and ripening related gene expression. The results indicate that ethylene greatly accelerate fruit ripening, and the ripening process can be inhibited by 1-MCP treatment both on physiological and molecular levels. The application of 1-MCP delayed seven to ten days on fruit ripening compared to controls. The overall information obtained from this study demonstrates that ethylene plays the critical roles in postharvest ripening, gene expressions and physiological property changes of ‘Mopan’ persimmon fruit during storage. The suppression of ethylene activity by 1-MCP provides the industry with an applicable technology to improve postharvest processing and ‘Mopan’ persimmon fruit value.