

Title Ethanol treatment inhibits internal ethylene concentrations and enhances ethyl ester production during storage of oriental sweet melons (*Cucumis melo* var. *makuwa* Makino)

Author Wen Wei Liu, Hong Yan Qi, Bing Hua Xu, Yan Li, Xiao Bin Tian, Yan Yan Jiang, Xiao Fei Xu and De Qing Lv

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Abstract

Compared to other melon types, oriental sweet melon (*Cucumis melo* var. *makuwa* Makino) is quite a different species with a poor shelf-life due to its typical climacteric behaviour, and thin pericarp and rind. In order to investigate the effect of ethanol application on postharvest storage at room temperature (24 °C) and quality of oriental sweet melon, we measured physiological and quality changes induced by ethanol vapor or ethanol injection. Both ethanol treatments significantly inhibited internal ethylene concentrations (IEC), and no ethylene peak occurred when compared with control fruit during storage. However, both ethanol treatments maintained firmness but without significant differences between ethanol-treated and the control melons, except with ethanol injection on day 4. Soluble solids contents were not affected by either treatments. Glucose, fructose and sucrose contents showed a greater increase in ethanol-treated melon flesh and peel tissues than in controls after four days, especially sucrose, the main sugar in melons. Compared with the control, both ethanol treatments resulted in different profiles and composition of aromatic volatile compounds during storage. Both ethanol treatments resulted in a significant increase in ethyl acetate, hexyl acetate and 2-methyl-1-butyle acetate, and a decrease of 2,3-butanediyl diacetate, phenylmethyl acetate and 2-phenethyl acetate. The contents of total esters, including eight newly detected ethyl esters, were 2–4 fold higher in ethanol-treated melons. Ethanol injection more effectively increased accumulation of aroma volatile compounds for a short time, while the effects of ethanol vapor persisted during the storage. Both ethanol treatments increased alcohol acyltransferase (AAT) activity in melon flesh within four days, and levels peaked three days earlier but lower than in the control. There were no significant differences in activities of alcohol dehydrogenase (ADH) and lipoxygenase (LOX) in ethanol-treated and control melons. In summary, postharvest ethanol application reduced the IEC of harvested oriental melons and improved levels of volatile aroma compounds, especially the ethyl esters.