1-Methylcyclopropene alleviates peel browning of ‘Nanguo’ pears by regulating energy, antioxidant and lipid metabolisms after long term refrigeration

Dongbing Tao, Junwei Wang, Lei Zhang, Yangao Jiang and Mei Lv

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Abstract

Ripening of ‘Nanguo’ pears (*Pyrus ussuriensis* Maxim.) can be slowed down by cold storage, but the peel of fruit is prone to browning when they are returned to room temperature. In this study, effects of 1-methylcyclopropene (1-MCP) treatment on peel browning (PB) of ‘Nanguo’ pears, as well as on energy, antioxidant and lipid metabolisms, were investigated during shelf life after cold storage. 1-MCP treatment inhibited the occurrence of PB in ‘Nanguo’ pears during 15 d of shelf life at 20 °C. 1-MCP treated fruit showed higher firmness, glutathione (GSH) content, ATP concentration and energy charge (EC) value. Meanwhile, lower ethylene production and respiration rate, content of H_2O_2 and $O_2\cdot^-$, glutathione disulphide (GSSG) content, as well as malondialdehyde (MDA) concentration and electrolyte leakage were detected in 1-MCP treated fruit. Activities and gene expression level of ATP synthase (*ATPase*), NADH dehydrogenase (*NDA*), vacuolar proton-inorganic pyrophosphatase (*VPP*) and glutathione peroxidase (*GPX*) were promoted by 1-MCP treatment. Activities and gene expression level of phospholipase D (*PLD*) and lipoxygenase (*LOX*) were inhibited by 1-MCP treatment. These results indicated that 1-MCP treatment could effectively alleviate PB in ‘Nanguo’ pears and the possible mechanisms were discussed.