Title Effects of short-term N_2 treatment on lipid peroxidation, anti-oxidant enzymes and flesh softening of kiwi fruits during cold storage

Authors Lili Song, Jinlin Mao, Yueming Jiang, Fei Tao, Linmei Ge, Haiyan Gao

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Abstract

Flesh softening is the main limitation to the postharvest storage, handling and marketing life of kiwifruit. Evidences suggest that pre-storage treatment with pure N_2 gas is potentially effective in inhibiting senescence of many harvested horticultural crops. To better understand the role of short-term N_2 treatment in softening of kiwi fruit, flesh firmness, malondialdehyde (MDA) and hydrogen peroxide (H_2O_2) contents, superoxide anion ($O_2.^-$) production rate, as well as activities of lipoxygenase (LOX), peroxidase (POD), superoxide dismutase (SOD) and catalase (CAT) were investigated. Kiwifruits were exposed to pure N2 gas for 6 h, and then kept in closed but vented containers for 35 days in the dark at 0-1°C and 95-100% relative humidity. Flesh firmness decreased rapidly during the cold storage time, and short-term N2 treatment inhibited the decrease in flesh firmness, particularly the rapid decrease within 7 days of the early storage, which suggested pure N2 could delay flesh softening of kiwi fruits at 1°C. MDA content, $O_2.^-$ production rate and H_2O_2 content increased in kiwifruit with storage time. Short-term N_2 treatment showed a lower level of lipid peroxidation compared to non-N_2 treated fruit, with a delay in increasing in both $O_2.^-$ production rate and H_2O_2 content. SOD, CAT and POD activities of the fruits markedly decreased during the cold storage, while LOX activity showed a maximum value on day 7, followed by a decline. The treatment with pure N_2 increased activities of SOD, CAT and POD, and decreased LOX activity. These data indicated that short-term N_2 treat¬ment delayed softening of cold stored kiwifruit involve alleviating lipid peroxidation via suppressing oxidative damage and enhancing antioxidant defense.