

**Title** Physiological responses and quality attributes of Chinese chive leaves exposed to CO<sub>2</sub>-enriched atmospheres

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### Abstract

Harvested leaves of Chinese chives were stored in air + 10, 20 or 30% CO<sub>2</sub>, or air for 7 days at 20 °C to determine the effects of CO<sub>2</sub>-enriched atmospheres on their physiology and quality. Leaf yellowing was visible at day 5 in air, whereas CO<sub>2</sub> enrichment delayed yellowing and retarded chlorophyll and protein degradation that accompanied leaf senescence. At 30% CO<sub>2</sub>, undesirable off-odors were induced, presumably due to accumulation of ethanol in the tissue. The ethanol contents did not change during storage in leaves exposed to 10 or 20% CO<sub>2</sub>, or air, while the content in leaves exposed to 30% CO<sub>2</sub> significantly increased. However, CO<sub>2</sub> enrichment did not significantly influence acetaldehyde concentrations for the leaves. Alcohol dehydrogenase (ADH) activity increased in leaves exposed to 10 or 20% CO<sub>2</sub>, while its activity in leaves exposed to 30% CO<sub>2</sub> was slightly higher than that of the control. Succinate dehydrogenase (SDH) activity greatly decreased in leaves exposed to 30% CO<sub>2</sub>, while its activity in leaves exposed to 10 or 20% CO<sub>2</sub> only decreased slightly. The content of pyruvate increased in leaves exposed to 30% CO<sub>2</sub>, while its concentration in leaves exposed to 10 or 20% CO<sub>2</sub> was slightly higher than that of the controls. Thus, our results indicate that it would be necessary to keep Chinese chives at 20 °C because of a lack of refrigeration in the distribution system, or in a modified atmosphere package designed to develop an optimum atmosphere during retail display, and suggest a potential for using CO<sub>2</sub>-enriched atmospheres at higher temperatures to help maintain quality.