Abstract

Harvested leaves of Chinese chive were stored in 0, 1 or 3% O_2 (balance N_2), or air for 7 days at 20 °C to determine the effects of low O_2 atmospheres on their physiology and quality. Leaf yellowing was visible at day 5 in air, whereas low O_2 treatment delayed yellowing and retarded chlorophyll and protein degradation that accompanied leaf senescence. The respiration rates of leaves stored at low O_2 atmospheres were substantially lower than those of the control during storage. However, at 0% O_2, undesirable off-odors were induced and visible anaerobic injury appeared in stored leaves, presumably due to a high accumulation of acetaldehyde and ethanol in the tissue. The contents of acetaldehyde and ethanol were very low during storage at 1% O_2, 3% O_2, or air. At 0% O_2, ethanol and to a lesser extent acetaldehyde, rapidly accumulated in the leaf tissue. Pyruvate decarboxylase (PDC) activity greatly increased in leaves exposed to 0 or 1% O_2, while its activity in leaves exposed to 3% O_2 was only slightly higher than that of the control. Alcohol dehydrogenase (ADH) activity greatly increased in leaves exposed to 1 or 3% O_2, while its activity in leaves exposed to 0% O_2 was only slightly higher than that of the control. The activity of ADH was about 250 times that of PDC during storage. Changes in ADH isozymes correlated well with changes in ADH activity. The potential for using low O_2 atmospheres to help in maintaining the quality of Chinese chive leaves is discussed.