

Title Using tissue ammonia and fermentative volatile concentrations as indicators of beneficial and stressful modified atmospheres for leafy and floral vegetables

Author Marita Cantwell

Citation Abstracts, 10th International Controlled & Modified Atmosphere Research Conference, 4-7 April 2009, Antalya, Turkey. 80 pages.

Keyword Ammonia; volatile; vegetable

Abstract

Ammonia, a product of protein catabolism associated with senescence of leafy green vegetables, is toxic to plants cell if not efficiently reincorporated by glutamate synthetase. In experiments on various leafy and floral vegetables (broccoli, cauliflower, romaine lettuce, spinach and sugar snap peas), tissue ammonia concentrations (spectrophotometric method) were measured as a possible indicator of stressful modified atmospheres and compared with the changes in concentrations of the fermentative volatiles ethanol and acetaldehyde (FID-GC). In cauliflower florets, increases in ammonia were associated with the increases in fermentative volatiles in 15% CO₂ atmospheres but minimal changes in ammonia and fermentative volatiles occurred in air or low O₂ atmospheres with 7.5% CO₂. Increases in ammonia concentrations in broccoli florets and sugar snap peas were also associated with increases in fermentative volatiles in 12 and 18% CO₂ atmospheres with 3% O₂. In cut romaine lettuce, atmospheres with 9% but not 6% CO₂ resulted in notable increases in ammonia, and concentrations were not affected by differences in O₂ concentrations (0.2, 1.0, or 21%), whereas increases in fermentative volatiles only occurred in cut lettuce stored in CO₂ atmosphere combinations with 0.2% O₂. Also in spinach, increases in ammonia were a consequence of storage in high CO₂ atmospheres. Ammonia can be used as another indicator of stress in modified atmosphere storage of leafy tissues. In some vegetable tissues, atmosphere conditions that resulted in increases in ammonia also resulted in a similar time course for increases in fermentative volatiles, but in other vegetable products ammonia concentrations indicated stressful atmospheres that were not associated with the onset of anaerobiosis.