Abstract

Controlled atmosphere (CA) and modified atmosphere packaging (MAP), which reduced O_2 levels (1-5%) and/or increased CO_2 levels (5-10%), have been shown to be beneficial in extending shelf life of fresh-cut produce by reducing physiological and physicochemical changes. However, the important interaction between CA/MAP and microbiological quality and safety must be considered. High CO_2 levels of > 10% and/or high O_2 levels of > 21% are expected to inhibit growth of not only spoilage bacteria but also foodborne pathogenic bacteria. I report here the effects of high CO_2 (5-20%) or high O_2 (60%) atmospheres on microbiological quality and safety of fresh-cut cabbage and mangoes.

In high CO_2 CA (5, 10, and 20%) storage of fresh-cut cabbage, a 20% CO_2 atmosphere accelerated the growth of coliform group at 10°C and coliforms and lactic acid bacteria at 20°C, which resulted in the development of water-soaking appearance. With MAP in which the CO_2 accumulated to >20%, coliforms and lactic acid bacteria on cabbage shreds grew markedly at 10 and 20°C. When fresh-cut cabbage was packaged in perforated OPP film with initial 10% CO_2, CO_2 in the film remained at about 10% and the growth of coliforms and lactic acid bacteria was inhibited for 4 days of storage at 10°C. The bacteria isolated from the shredded cabbage in the active MAP were predominantly Gram-negative rod-forms including Enterobacteriaceae and phytopathogenic bacteria, while only lactic acid bacteria was isolated as Gram-positive bacteria. With fresh-cut 'Carabao' and 'Nam Dokmai' mangoes, a 10% CO_2 CA helped in reducing bacterial counts when stored at 13°C, whereas a 60% O_2 CA stimulated the growth of mesophilic aerobic bacteria on 'Carabao' cubes and yeasts on 'Nam Dokmai' cubes at 13°C. A 10% CO_2 MAP reduced the bacterial community of fresh-cut mangoes as compared to those flushed with air. Bacterial flora in 'Nam Dokmai' mango cubes consisted mostly of Gram-negative rods assigned primarily to phytopathogenic bacteria. No human pathogens were detected in any of the samples.