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Effects of modified atmosphere packaging on the shelf life of *Broccoli* Florets based on the amounts and activities of respiratory enzymes

Modified atmosphere packaging is a promising technique for prolonging the shelf life of horticultural products. However, no metabolic data are available on why this method is effective in extending shelf life. Therefore, the relationship between modified atmosphere packaging on shelf life of *broccoli* florets based on the amounts and activities of respiratory enzymes was investigated in the present study. *Broccoli* florets were selected because they rapidly deteriorate because of the high rate of respiration. The samples were stored under normoxia (ambient air) conditions or under hypoxia (modified atmosphere packaging or controlled atmosphere storage) at 15°C for 150 hrs or at 25°C for 50.5 hrs. Oxygen uptake rate, loss of mass, green color and L-ascorbate of the florets were significantly depressed under hypoxia than under normoxia. Also, the amount of alternative oxidase (AOX) under normoxia was significantly higher than under hypoxia at 25°C. In contrast, the amount of Cytochrome c oxidase (COX) was stable under all atmospheric conditions tested. These results suggest that *broccoli* florets control O₂ uptake rate by controlling the induction of AOX amount. The amount of COX needed to generate adenosine 5'-triphosphate may be needed to be stable to keep metabolism even after harvest. Discrimination factor (D, enzymatic activity ratio of AOX against COX) was stable under all atmospheric conditions tested. This means that the activities of AOX and COX were simultaneously reduced under hypoxia. The amounts of both AOX and COX were reduced over time during storage and were independent of atmospheric conditions. In addition, oxygen uptake rate at 15°C was slower than that at 25°C. This result may be because of the fact that the induction level of enzymatic protein was low at 15°C. Thus, induction level may become reduced over time because of aging.

Biography

Yoshio Makino has his expertise in modified atmosphere packaging of fruits and vegetables. He is investigating the reason why this technique is effective for keeping freshness of horticultural products based on metabolic analysis. He has published many research articles and books on this topic and has been awarded many times.

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