

Moderation of respiratory cascades and energy metabolism of fresh-cut pear fruit in response to high CO₂ controlled atmosphere

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Abstract

Controlled atmosphere (CA) package serves as a nascent research tool in post-harvest, while validation of high levels of CO₂ is plausible owing to the deficiency of biological understanding. Hence, the effect of 10 % CO₂ on the respiration pathway and energy metabolism of fresh-cut pears was investigated in this study. During 5 days of storage, total respiratory rate was moderated with maintained mitochondrial membrane integrity and slowly increasing membrane permeability under 10 % CO₂. Under 10 % CO₂ CA package, the energy charge was 1.6 times than that of control. Enzymes involving in energy metabolism were induced or inhibited in activity and expression level. Comprehensively considering the changes among enzymes and genes, the preservative effects of high level of CO₂ CA package on fresh-cut pear fruit could be divided into three aspects: inhibition of senescence, decrease of energy status and promotion of stress resistance. This work revealed the undergoing biochemical mechanism of how fresh-cut pear act in response to high CO₂ CA package, from the perspective of respiration pathway and energy metabolism.