

Physiological responses and quality attributes of muscadine grape (*Vitis rotundifolia* Michx) to CO₂-enriched atmosphere storage

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Abstract

Muscadine grape (*Vitis rotundifolia* Michx) is a non-climacteric fruit that rapidly loses quality during storage. This study aimed to assess the effect of controlled atmosphere (CA) on quality parameters and muscadine grapes decay. Berries of two muscadine grape cultivars, Triumph, and Supreme, were stored at 4 °C with 95 % relative humidity in either regular air (AIR), regular CA (RCA) (6 % O₂ + 10 % CO₂), or CA with extreme CO₂ level (ECA; 4 % O₂ + 30 % CO₂) for up to 42 d. Treated berries with either RCA or ECA provided better control of weight loss. Both CA treatments reduced decay incidence, but there was no decay in ECA berries after 42 d for both cultivars and no evidence of CO₂ injury. The results showed that berry softening was significantly delayed by RCA and ECA, which had a lower ethylene production rate than berries exposed to AIR. Application of RCA and ECA also retained greater total antioxidant activity, total phenolic compounds, and firmness compared to AIR. These results demonstrate that maintaining CA conditions postharvest leads to improved preservation of compositional quality and delayed softening and decay of harvested muscadine grapes compared with AIR storage.