

Title Effect of high CO₂ pretreatment on quality, fungal decay and molecular regulation of stilbene phytoalexin biosynthesis in stored table grapes

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Abstract

Table grapes (*Vitis vinifera*) cv. Cardinal stored at low temperature were analysed to determine the effect of pretreatment with 20 kPa O₂ + 20 kPa CO₂ + 60 kPa N₂ for 3 days on quality and control of decay. The pattern of stilbene synthase (STS) gene expression and trans-resveratrol levels were also analyzed in grapes during low temperature storage at 0 °C and further shelf-life at 20 °C for 2 days. Our results showed that high CO₂ pretreatment was effective for improving appearance of the bunches and maintaining the quality of the berries. In CO₂-treated bunches the browning and withering index, the decline in relative water content and the weight loss were also lower than in non-treated ones. The levels of STS mRNA and the accumulation of trans-resveratrol in CO₂-treated grapes were much lower than in the non-treated grapes during low temperature storage. Moreover, the pattern of STS gene expression and trans-resveratrol content in CO₂-treated grapes was consistent with the reduction of natural total decay produced by this pretreatment. This effective non-stressing treatment avoids the induction of trans-resveratrol during low temperature storage until its synthesis is enhanced during shelf-life at 20 °C.