Title Influence of wounding and aging on 1-MCP sorption and metabolism in fresh-cut tissue and cell-free homogenates from apple fruit

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Abstract

Non-receptor sorption of 1-MCP has been reported for a number of materials including woods and cardboard, as well as fruit and vegetables. Sorption rates and capacity are enhanced in response to tissue processing (cutting), suggesting that surface area, wounding and epidermis removal are factors that potentially contribute to depletion of gaseous 1-MCP in static systems. A processing-induced increase in 1-MCP sorption has been studied using fresh-cut apple and apple cell-free homogenates (CFH) as model systems. Fresh-cut tissue from four apple cultivars showed high rates and capacities for 1-MCP sorption, and cultivar rankings for sorption were maintained in CFH. Apple tissue subjected to short-term aging (6 h) showed marked declines in 1-MCP sorption. Trimming the surface tissue of aged tissue resulted in a 90% recovery of sorption properties. CFH prepared from progressively aged apple tissue showed no decline in 1-MCP sorption, whereas direct aging of CFH resulted in declines. The data from aged apple tissue and CFH suggested that loss in tissue sorption was due to processes occurring at the cut surfaces. Anoxia (0.02 kPa O_2) suppressed sorption rates of fresh-cut apple tissue and apple CFH by 74 and 68%, respectively. Ascorbate reduced sorption rates in apple tissue and CFH by 82 and 65%, respectively. Sorption rates of tissue and CFH were reduced by 88 and 73%, respectively, by hypotaurine, an antioxidant that targets the hydroxyl radical. The data suggest that 1-MCP sorption by fresh-cut apple tissue is due to oxidative metabolism in response to wound-induced production of reactive oxygen species.