Titl Inhibition of wound-induced ethylene does not prevent red discoloration in fresh-cut endive (*Cichorium intybus* L.)

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Abstract

Consumer demand for lightly processed ready-to-eat fruits and vegetables increases consistently as convenience and easiness of preparation become decision factors in food purchases. However, red discoloration of cut leafy vegetables limit storage life and the flexibility of offering specific products. This is the case of fresh-cut endive (*Cichorium intybus* L.), that turn red quickly and thus have a limited shelf life either alone or in mixed vegetables products. Heat shock was shown to block red discoloration in cut endive, through significantly reducing the level of phenylalanine ammonia-lyase (*PAL1*) transcripts and stimulating peak levels of heat shock protein (*HSP90*) transcript accumulation shortly after cut. With the aim of evaluating to what extent the effect of heat shock was related to the blockage of wound-induced ethylene, we applied [S]-*trans*-2-amino-4-(2-aminoethoxy)-3-butenoic acid hydrochloride (AVG) to block ethylene synthesis and 1-methylcyclopropene (1-MCP) to block the response to ethylene in fresh-cut endive, and analysed wound induced ethylene emission as well as *HSP90* and *PAL* expression patterns as compared to samples treated by heat shock (46 °C/120 s). Ethylene was measured continuously during 48 h with a laser-based ethylene detector, and real-time quantitative PCR (qPCR) was performed for *PAL1* and *PAL2* as well as for degenerated *HSP90* primers. Red discoloration limited the shelf life of 1-MCP and AVG treated endives to 48 h, whereas samples treated with heat shock maintained good quality for 8 days. Wound-induced ethylene was blocked by AVG, inhibited by 1-MCP but not by heat shock, which was shown to delay ethylene emission by at least 8 h after cutting, after which the rates increased to higher levels than in the control and took longer to decrease. It was concluded that ethylene is not the main factor in the processes that lead to tissue discoloration in fresh-cut endive.

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