Title The effect of CO_2 and 1-methylcyclopropene on the regulation of postharvest senescence of mint, *Mentha longifolia* L.

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Abstract

The regulatory effects of 5 kPa CO_2 and of the ethylene action inhibitor, 1-methylcyclopropene (1-MCP) at 0.5 μmol/l on the senescence of harvested mint, *Mentha longifolia* L. were assessed. Visual parameters of senescence including yellowing, browning, decay and leaf abscission were recorded and scored on scales linking the onset and progression of senescence to marketability. The effects of plant age on the rate of postharvest senescence and on the efficacy of the CO_2 and 1-MCP treatments were also investigated. All experiments were repeated with and without the presence of exogenous ethylene. Two experimental formats were used, with 6 days storage at room temperature representing local market conditions, and 6 days cold storage at 1.5 °C followed by 4 days at room temperature representing export market conditions. Sprigs from old plants were no longer of marketable quality after 6 days storage at room temperature. Exogenous ethylene accelerated the onset of senescence causing unacceptably high rates of leaf abscission. Raised levels of CO_2 in a controlled atmosphere system were found to be more effective in inhibiting senescence without the presence of exogenous ethylene than pre-treatment with 1-MCP, and no additive effect was found. However in the presence of exogenous ethylene, a combined treatment with 1-MCP together with raised CO_2 levels resulted in a significant additive effect in nullifying the ethylene-induced leaf abscission. Respiration rates as measured by CO_2 production, and ethylene production, were recorded throughout all experiments. While CO_2 levels were not affected by any experimental treatment, ethylene production was elevated in mint sprigs exposed to an initial dose of gaseous 1-MCP, and was further increased under a combined treatment of 1-MCP together with 5 kPa CO_2. However in the presence of exogenous ethylene, CO_2 strongly suppressed the 1-MCP induced ethylene production.