

Abstract

Mechanical harvest was simulated by dropping mature but not ripe European plums (*Prunus domestica* L.) from a range of heights onto a plate. These plums were exposed to $0.5 \mu\text{l l}^{-1}$ 1-MCP either before or after this treatment and cold-stored at 2°C and 95% relative humidity for 4 weeks. Mechanically harvested European plums lost their firmness during 4 weeks cold storage at 2°C with Shore firmness values of 52, whereas manually picked control fruit remained sufficiently firm for fresh fruit consumption with fruit firmness Shore values above 60. European plums consumed oxygen at a rate of $1\text{--}3 \text{ mg kg}^{-1} \text{ h}^{-1}$ with a constant RQ of ca. 1.1, due to CO_2 re-fixation and malic acid as major respiratory substrate, during the 4 weeks of cold storage at 2°C . Fruit respiration of $32 \text{ mg O}_2 \text{ kg}^{-1} \text{ h}^{-1}$ at 20°C , based on Arrhenius plots, was typical of climacteric plums. This rate was halved by 1-MCP during the first 5 days in cold store, an effect which diminished after these 5 days during subsequent shelf-life indicating a temporary effect of 1-MCP on fruit respiration.

Mechanical harvest increased loss of fresh mass during cold storage, decreased fruit firmness and induced internal browning, but affected neither respiration nor ethylene synthesis. Treatment with 1-MCP before mechanical harvest prevented adverse effects such as softening and bruising, while the same treatment after mechanical harvest was less effective, indicating the benefit of a tree treatment. Manually picked, 1-MCP treated plums, however, benefited, in terms of fruit quality, by preventing or retarding bruising in the 4 weeks of cold storage.

Overall, these results (a) classify the European plum *P. domestica* L. as a climacteric fruit based on the large respiration and ethylene fluxes and rise during ripening, and their limited responses to 1-MCP, i.e. not as 'suppressed climacteric'; (b) show that European plums can easily be cold-stored for 2 or 4 weeks, if plums are harvested mechanically or picked manually, respectively.