

Abstract

Cherry tomatoes harvested in bunches are sensitive to abscission during storage and this creates a significant commercial problem for this produce. As a result of fruit abscission, storage and shelf life duration of the produce are largely shortened. Fruit abscission occurs from two abscission zones that are present in the bunch: the joint (J) in the middle of the pedicel and the receptacle (R), which connects the fruit to the pedicel.

In the present work we examined the effect of methyl jasmonate (MJ), abscisic acid (ABA), ethylene and the inhibitor of its action, 1-methylcyclopropane (1-MCP) on abscission and fruit quality (color and firmness) of cv. 1335 (Shiren). In addition, the effects of postharvest heat stress and the relative humidity during storage on fruit abscission from the abscission zones were examined. Simultaneously, the expression of *Cel5* and *Cel8*, two tomato endo-1, 4- β -glucanases (EGase), were examined during storage and under the influence of the above-mentioned treatments.

In previous studies it was shown that 1-MCP significantly delayed abscission of fruits from the bunch in cv. R-819. In six experiments performed in the present study with fruits of cv. 1335 it was found that ethylene did not enhance abscission during storage either following treatment for 3 h. ($50 \mu\text{L L}^{-1}$ exp. 1-2, $100 \mu\text{L L}^{-1}$ exp. 3-4) or for 20 h ($50 \mu\text{L L}^{-1}$ exp. 6). More over, is the observation that the effect of 1-MCP (600 nL L^{-1}) was inconsistent and only partial abscission inhibition was obtained in some experiments. In addition, in a series of three experiments, exogenous MJ (1 mM) and ABA ($10 \mu\text{M}$) did not enhance abscission during storage. Heat stress treatment ($40\text{-}45^\circ\text{C}$) for 1h did not have any significant effect on fruit abscission. In the contrary, application of 1-MCP induced a significant inhibitory effect on fruit ripening, that resulted in delay of red color development and firmness maintenance. In order to characterize the expression of tomato endo-1,4- β -glucanases, *Cel5* and *Cel8* were examined in two abscission zone tissues at several time points during storage. Addition effects of 1-MCP and ethylene on the expression of these genes were examined. *Cel5* was expressed at higher levels than those of *Cel8*, and its levels increased during storage, where as a higher expression of *Cel8* was detected on the day of harvest. Ethylene enhanced the expression of *Cel5*, whereas 1-MCP partially blocked the expression of this gene. Storage of bunches that were picked during the winter at a high relative humidity (90-95% RH) and 12°C inhibited fruit abscission

from the pedicel abscission zone. On the other hand, storage and low humidity caused high abscission of fruits from the pedicel abscission zone. These trends were seen also during shelf-life simulation at 20°C.

An inverse correlation was shown between the fruit adhesion forces at the harvest to the abscission percentages after storage, due to these facts it seems that adhesion forces at harvest can be used as storage capability parameter of the produce.

The results of the present work demonstrate that cv. 1335 is less sensitive than cv. R-819 to postharvest abscission enhancing treatments. However, this cv. might be very sensitive to abscission during the winter (end of December through the begging of February) and during the summer (July). Only during March and April we detected relative low levels of abscission after 12-15 days of storage, which allows fruit shipment through the sea during this season.