Abstract

Postharvest moisture loss leads to wilting of horticultural produce which shortens their shelf life and reduces their commercial value. Effects of preharvest water stress, potassium (K), cultivar, water vapour pressure deficit (WVPD) and recharging (rehydration in water) on postharvest moisture loss of carrots (*Daucus carota* L.) during short term storage were studied.

In greenhouse experiments, carrots subjected to water stress for 4.5 weeks preceding harvest had higher postharvest moisture loss, compared to unstressed carrots. Root water potential (Ψ_R), followed by relative solute leakage (RSL), accounted for most of the variation in moisture loss. It is suggested that preharvest water stress increases carrot tissue permeability which enhances moisture loss.

Increase in K fertilization to 1.0 mM increased carrot size and lowered cell ΨR and osmotic potentials ($\Psi\pi$R) and RSL from the root tissue. Regression analysis shows that K affects moisture loss mainly by influencing carrot size and tissue permeability, and that the benefit of K fertilization in improving shelf life is limited to conditions of low K availability.

Consistent differences in postharvest moisture loss among eight field-grown, late harvested carrot cultivars were observed at low relative humidity. These differences, which accounted for up to 6 days of difference in shelf life, were associated with specific surface area and transpiration coefficient of carrot roots.

Carrots at high WVPD lost more moisture. The results showed carrot tissue permeability increases during storage at high WVPD which further enhances the rate of moisture loss.

Increase in duration of recharging increased carrot weight gain but had no effect on the rate of moisture loss during subsequent storage. Weight gain was greatest during the first week after harvest. Recharging, therefore, should be explored as a means to replace moisture lost and extend shelf life of carrots.

The effects of preharvest water stress, nutrition and cultivar on specific surface area, ΨR and tissue permeability were found to be important in determining the shelf life of carrots. It may be

possible to improve the shelf life by reducing preharvest water stress, K fertilization, cultivar selection, storage at high relative humidity, and recharging.