

Title Diurnal carbohydrate dynamics affect postharvest ethylene responsiveness in portulaca (*Portulaca grandiflora* ‘Yubi Deep Rose’) unrooted cuttings

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Abstract

Portulaca (*Portulaca grandiflora*) is an herbaceous ornamental annual plant that is commonly propagated by shoot-tip cuttings and shipped long distances before they are rooted in greenhouses. During transit and rooting, a significant number of leaves usually abscise, which delays or prevents subsequent rooting. We investigated the effect of preharvest diurnal carbohydrate dynamics on postharvest performance of unrooted shoot-tip cuttings of portulaca ‘Yubi Deep Rose’. The production of ethylene was quantified, as well as the efficacy of 1-methylcyclopropene (1-MCP) to improve the postharvest performance. The initial carbohydrate concentrations in cuttings increased with later harvest during the day (8 a.m., 12 p.m., and 4 p.m.). When cuttings were placed into a dark postharvest environment at 20 ± 1 °C for 48 h, cuttings harvested at 8 a.m. had complete leaf abscission, whereas only partial leaf abscission was observed in cuttings harvested at 12 p.m. and 4 p.m. Leaf abscission was negatively correlated with preharvest leaf carbohydrate and stem starch concentrations, but not significantly correlated with postharvest ethylene production during storage. Application of 1-MCP improved the storage quality of cuttings, irrespective of the time of cutting harvest, and did not inhibit the rooting response during subsequent propagation. Collectively, these results indicate that with the increase in preharvest endogenous carbohydrate levels of portulaca cuttings, as the photoperiod progresses, subsequent postharvest ethylene responsiveness decreases, but there is no effect on ethylene synthesis.