Title Tissue permeance of prickly pear cactus stems (*Opuntia* spp.) To CO_2, O_2 and H_2O vapor as a function of temperature and relative humidity

Author E.M. Yahia and J.C. Guevara

Citation ISHS Acta Horticulturae 857:461-468. 2010.

Keyword prickly pear; Opuntia; vapor

Abstract

Characterization of the internal atmosphere composition offers the potential to explain variability in response of horticultural products to modified atmospheres (MA) treatments and to quantify permeance of skin to respiratory gases. Stem skin permeance to O_2 (β_{O2}) and CO_2 (β_{CO2}) were determined as a function of temperature (T) and relative humidity (RH). Surface chambers close to equilibrium with the stem's internal atmosphere were used to monitor internal atmosphere composition of prickly pear cactus steam. Physical equilibration of chamber contents over fruit surface was completed approximately in 4 h. However, physiological changes in the composition of internal atmosphere indicate that substantial changes continued to develop for extended periods. β_{O2} decreased in greater proportion than β_{CO2} at high RH, as a result an inversely proportional relation between permeance to gases and the RH was determined. β_{H2O} also decreased as RH increased. The Arrhenius model describes the T effect on tissue permeance. The following function describes the effect of T and RH on tissue permeance $\beta_x=(P_0 \cdot RH^{P1}+P_2)\cdot e^{(1/T)}$. Surface chambers adhered over stem surface are adequate to quantify the composition of the atmosphere in direct contact with the stem cells.