

### Abstract:

Air relative humidity (RH) significantly affects the storage life and quality of horticultural products. RH is determined by the balance between rates of moisture (latent heat) entry into and removal from the air. Conditions in a small walk-in cool store and its associated refrigeration system were monitored to validate moisture transport models, investigate the effect of design and operating factors on RH, and explore the effect of coil defrost frequency on store performance. Store RH was accurately predicted. Measured results and model predictions showed important ways of influencing RH: control of sensible heat entry (e.g. insulation levels), management of air infiltration rates, design and operation of cooling coils with appropriate air-to-refrigerant temperature difference, choice of temperature control systems, and selection and equilibration of packaging materials. Optimisation of air RH by such methods allows cold chain improvement without unnecessary expense on dedicated humidity control or advanced packaging systems. At high defrost frequency, energy use increased and temperature control was poorer due to the pull-down after each defrost. At low frequency, RH was lower, energy use increased and temperature control was poorer due to coil performance decline and longer duration defrosts. For the system studied, a defrost frequency of 8 to 12 hours was optimal.