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**DESIGN AND PERFORMANCE OF A LAB SCALE CONTROLLED
ENVIRONMENT CHAMBER (CEC) USED FOR DETERMINATION OF
HORTICULTURAL PRODUCE QUALITY DETERIORATION**

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ABSTRACT A project was initiated to develop models for predicting physiological and microbial changes, diseases and physiological disorders development of fresh horticultural produce, as a function of time (t), temperature ($^{\circ}\text{T}$), relative humidity (RH), and quality parameters measured at harvest and at intermittent steps in the cold chain. Tomato was selected for this initial work due to its local availability year round. A lab scale storage device was developed to store fruits or vegetables at any combination of relative humidity and temperature possibly encountered in the cold chain at any time after harvest, while allowing sampling at various time intervals. The combinations of three RH (75, 85 and 95%) and three $^{\circ}\text{T}$ (1, 10 and 24°C) were used during the evaluation of the performance of the storage device. Produce sampling occurred on day 0, 3, 6, 10 and 13. The device consisted of three individual 222 L chambers assembled on a single support system that could be easily transferred to a refrigerated room maintained at a slightly lower $^{\circ}\text{T}$ than required inside the chambers. The RH of each chamber was controlled separately by a condensing unit inside each chamber that removed the excess moisture in the air by cooling down the ambient air below the set point. An electric resistance heating system was included in each chamber to generate sufficient heat to control the $^{\circ}\text{T}$. An appropriate quantity of water was poured on the floor of each chamber to generate moisture as required. Fans and diffusers were used to distribute air uniformly within each chamber. The performances of the individual chambers were measured in terms of $^{\circ}\text{T}$, RH and air distribution uniformity, as a function of position and time. Detailed design and performance evaluation are presented.

Keywords: Lab-scale storage chambers, temperature control, relative humidity control, fresh fruit and vegetables, quality deterioration