Abstract:

The Horticultural Research & Development Centre of Agriculture & Agri-Food Canada, located in Saint-Jean-sur-Richelieu, has been investigating controlled atmosphere (CA) storage for many years. In the early 1990's, a lab-scale CA storage facility for experimental research was developed to control CO_2 and O_2 levels in small independent circular plastic containers (mini-chambers) using a manual sampling approach. This preliminary system was subsequently developed into an advanced, fully automated control system. Based on a proportional controller (PI controller), the new control software takes into account errors originated by the physiological changes of the stored produce and readjusts the control parameters to maintain the desired gas conditions in the chambers. In addition to the circular containers, in-house expertise was used to design and construct, unique variable volume mini-chambers that remain air tight by means of a water channel. The control system was tested using 42 mini-chambers with different volumes and types of produce in CA. The performance of the new control system was evaluated and proved satisfactory.