

### Abstract:

Current day perishable supply chains require intermediate points for manual produce quality inspection. Over the last decade international seatriansport of fruit and vegetables in reefer containers has grown tremendously. Reefer containers may completely close the cold chain only if produce quality inspection is automated. The observation of this growing need for automatic produce quality monitoring has triggered this research. The aim is twofold: to reveal a correlation between fruit gas exchange rates and actual produce quality aspects (1) and to automatically monitor fruit's gas exchange rates in containers from one-point gas concentration measurements only (2). Large experimental datasets have been collected to assess the correlation between respiration, ethylene production and ripeness-related firmness for Elstar apples. Both simulations and experiments have been done to test the feasibility of monitoring (variations in) respiratory activity over time. On the one hand the results prove that both objectives are feasible, at least for Elstar apples. On the other hand some uncertainties remain: 1. Uncertainty in the observed correlation between gas exchange rates and apple firmness, 2. On-line monitoring of gas exchange rates in reefer containers may be hampered by e.g. unknown leak rates, 3. To what extent may the observed correlation between quality aspects and gas exchange rates be generalised to other perishable commodities.