Title   Prediction of apple quality from mass loss

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Abstract

Prediction of fruit quality during storage would lead to and increased processing efficiency in packing facilities. At least for apples, tools such as the acoustic impulse response technique can predict firmness in storage, but are empirical and work only on a single fruit. Fruits are stored in bins and behave collectively, thus tools that can predict fruit population quality are needed. We tested the hypothesis that fruit quality can be predicted by tracking mass loss during regular (RA) and controlled atmosphere (CA) storage. If there is a relationship, then automated measurement of mass loss may be used to provide quality information on firmness of apples while in storage. Mass loss of 2 cultivars and sizes of bagged, apples was measured using an electronic hanging scale. Data were automatically collected every 10 min and transferred to a computer for analysis. Every 2 weeks other apples were destructively tested for firmness, soluble solids concentration, and titratable acidity. Percent mass loss increased linearly with time for bagged apples of both sizes. Apples in RA storage lost about 1.4 to 1.8% of mass over 81 d and about 3.4 to 4.4% of mass in CA storage over 152 d. Of the Red Delicious apples, only large apples in RA storage lost firmness during the experiment. All Golden Delicious apples lost firmness except small apples in CA storage. Only large Red Delicious apples in CA storage lost a significant amount of soluble solids. Titratable acids were only lost in Golden Delicious apples. Highly significant linear regression relationships were found between percent mass loss and firmness, soluble solids concentration, and titratable acidity when these quality characters decreased during the experiment. It is possible to electronically track mass loss on populations of apples for the prediction of firmness, soluble solids concentration, and titratable acidity while in RA and CA storage conditions. It is likely that this approach will apply to all fruits and vegetables that lose mass and quality during storage.