Title Electromyography of the masticatory muscles can detect variation in the mechanical and sensory properties of apples
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Abstract

Electromyography (EMG) of the masticatory muscles was compared with puncture testing and sensory evaluation, in a study of the textural properties of Red Delicious apples. An aim of the work was to use EMG in predictive models of sensory mealiness, as this property is strongly negatively associated with apple acceptability. It was found that subjects' EMG sensitivity and repeatability are as good as, and frequently better, than their sensory sensitivity and reliability. In addition to systematic effects associated with data recording session and subject, EMG data was also systematically affected by subjects' behavioural changes, specifically, the sensory evaluation being undertaken. Once these unwanted sources of variance were removed using suitable data pre-treatment, frequency-domain EMG data were correlated with puncture test data, and a significant relationship obtained for six out of thirteen subjects. For five out of these six subjects, the strength of this relationship was improved by making use only of higher frequencies (>15 Hz) in the EMG spectrum. EMG and puncture test data were each correlated with the sensory data. The nature of these relationships, in which the EMG frequency dependence effect was also clearly exhibited, demonstrated substantial common information content between the techniques. Finally, EMG and puncture test data were collectively used to model sensory mealiness, using univariate, bivariate and stepwise regression. Highly significant models were obtained for all but one subject's sensory mealiness scores. In most cases, the best models used combinations of puncture test and EMG data from up to two of the four available electrodes.