Title Texture analysis of Red Delicious fruit: Towards multiple measurements on individual fruit

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Abstract

The sensory texture of Red Delicious apples was studied using single point and time–intensity (TI) methods together with penetrometers and in vivo techniques. Testing was performed in two trials on a per fruit basis, not with fruit batches. The standard penetrometer was significantly correlated ($p < 0.05$) to sensory hardness, juiciness, mealiness, crunchiness and degree of breakdown, but not to skin toughness. Facial muscle activity during chewing was collected with electromyography (EMG) together with spit outs for individuals. Parameters such as work done during chewing were extracted from the full EMG signals, and some were found to be related significantly ($p < 0.05$) to the penetrometer data and to sensory hardness. The aspect ratio of expectorated particles related significantly ($p < 0.05$) to sensory hardness and skin toughness.

Principal component analysis shows that 76% of the variance in the combined data set was explained by seven components in Trial 1 and 73% by six components in Trial 2. The first component in both trials was described, principally by hardness, mealiness and the penetrometer value. The second component was described by the EMG signal parameters in Trial 1, and the apple skin properties in Trial 2. Sensory terms hardness, mealiness, crunchiness and juiciness were inter-correlated which may indicate that the texture of Red Delicious apples is perceived as mainly one-dimensional.