Abstract

A hyperspectral imaging system has been built within the wavelength range of 400–1000 nm for detecting bruises on 'Jonagold' apples. A total of 160 apples, i.e., sound ($n = 65$), impact bruise ($n = 80$) and drop bruise ($n = 15$) were analysed. Principal components analysis (PCA) was used to aid in visualizing the hyperspectral data and developing criteria for the selection of the efficient wavebands. Based on the scores images of the first principal component, algorithms for bruise detection and the stem-end/calyx identification were developed. In the investigated samples, the correct classification rate for sound apples was 84.6 and 77.5% for the 1-day-old bruises. None of the sound tissue was misclassified as stem-end or calyx; 98.3% of the stem-end/calyx presented in the images was correctly recognized and only 2.5% of bruises were misclassified as stem-end/calyx.