Abstract

Hyperspectral reflectance images of two cultivars of apples were acquired after fecal treatments at three different concentrations to explore the potential for the detection of fecal contaminants on apple surfaces. Region of interest (ROI) spectral features of fecal contaminated areas showed a reduction in reflectance intensity compared to those of uncontaminated skins. Large spectral differences between uncontaminated and fecal contaminated skins of two types of apples occurred in the 675–950 nm visible/NIR region, which provided the basis for developing universal algorithms in the detection of fecal spots. Comparison of a number of processed images revealed that a dual-band ratio ($Q_{725/811}$) algorithm could be used to identify fecal contaminated skins effectively. The result was most important as the two bands are away from the absorptions of natural pigments (such as chlorophylls and carotenoids), and hence can reduce the influence from color variations due to different apple cultivars.