

# Authentication of the geographic origin of Yangshan region peaches based on hyperspectral imaging

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## Abstract

Peaches from the Yangshan region, a China-protected geographical indication product (CGIA), has high economic value because of excellent quality, and price is premium over ordinary peaches. However, authentication of the origin of peaches from this region is challenging because of adulteration in the market and the similar appearance of different cultivar. This research was aimed at developing an effective method based on hyperspectral imaging combined with a group sparse representation (GSR) classifier for the geographic origin authentication of Yangshan region peaches and to interpret the hyperspectral fingerprint with physiological metabolism using high-performance liquid chromatography (HPLC) analysis. Two cultivars, 'Baifeng' and 'Hujing', were collected from two peach-producing counties a short distance, from Yangshan and Nanjing regions. Higher contents of total sugars and a higher sugar-acid ratios were found in peaches from Yangshan region probably due to the large differences between day and night temperature. The effective bands for distinguishing fruit from Yangshan region in the range of 400–1000 nm were related to the contents of anthocyanin and some other pigments, while in the near-infrared range (1000–1900 nm), sucrose and acids played important roles in distinguishing different peach types. This research compared the proposed GSR classifier with five other classifiers, and the results showed that the GSR classifier achieved an overall classification accuracy of 99.3% in a few milliseconds of online authentication time. Moreover, analysis of peaches from another harvest season resulted in an average accuracy of 95.8% verification of the GSR classifier. Hyperspectral imaging combined with physiological metabolism analysis has potential for the origin authentication of Yangshan region peaches.