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Abstract

Saffron (*Crocus sativus*) stigmas as a flavoring commodity command a very high price in international food markets and, as a result, are a candidate for various kinds of fraud. This paper reports on the use of thin layer chromatography combined with image analysis (TLC-IA) and chemometrics techniques for validating the authenticity of saffron and rapidly identifying the type of adulterants. This method includes several pre-processing steps, such as correcting the general baseline (using the asymmetric least squares (AsLS) algorithm), converting the images to RGB chromatographic channels, and removing the shifts and concavity of spots (using a correlation optimization warping (COW) algorithm) prior to image analysis of saffron thin layer chromatography patterns. After employing the preprocessing sequence, different unsupervised multivariate data analysis (i.e. principal component analysis (PCA) and k-means) and supervised chemometric methods (i.e. partial least squares discrimination analysis (PLS-DA), variable