

Low-cost e-nose as an affordable tool for identification of black tea origin

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Tea adulteration is a common practice where the leaves of high quality are mixed with samples from cheaper manufacturers. Identification of black tea origin is, therefore, extremely important to guarantee product quality. Multi-sensor devices such as electronic-nose (e-nose) is a fast and non-invasive method and stands out as a better alternative to laborious and expensive methods such as gas chromatography-mass spectroscopy (GC-MS) and high-pressure liquid chromatography (HPLC) for identification of tea origin. This work aimed to use a low-cost (less than \$200) e-nose as a non-destructive tool to classify tea leaves from two different countries (Brazil and India). The e-nose system was equipped with 8 gas metal oxide sensors (MOS) for analysis of six samples from Brazil and three from India. Principal Component Analysis (PCA) was used to investigate the variations in the data obtained by e-nose. Scores plot PC1 vs PC2 explained 99.21% of the total variance and showed a complete separation between the two groups of samples. Partial Least Squares-Discriminant Analysis (PLS-DA) was applied to classify the leaves into their respective classes, achieving sensitivity of 100%, while accuracy was close to 80% when discriminating between Brazilian and Indian samples. Therefore, the low-cost e-nose was able to classify the two classes of tea with reasonable accuracy and can then be used as an affordable way identification of black tea origin.