

# **Detection of Adulteration of Extra Virgin Olive Oil with Edible Oils by Electronic Nose**

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Virgin olive oil is highly appreciated by consumers because of its pleasant flavour and nutritional value. Since it is a food of high price, its adulteration with other cheaper or lower quality edible oils can lead to a large economical profit. Authentication of virgin olive oil has become an important subject from both commercial and health aspects. The most common adulterations are those carried out either with lower quality olive oils such as olive-pomace olive oil or with other edible oils such as sunflower, soybean, corn, palm, or hazelnut oil.

Several analytical techniques have been proposed for the monitoring of adulteration of virgin olive oils with other edible oils. However, most of these techniques require too much time and sample preparation. In recent years, electronic olfactometry, an artificial approach to human olfaction, combined with pattern recognition techniques provides a rapid and efficient tool for the classification of odours with a simple sample preparation and a decrease in time and cost of analysis. In this respect, electronic nose has been used to evaluate the quality of olive oils in several researches successfully.

The objective of this study was to detect the adulteration of edible oils in extra virgin olive oil at 4 different levels by using an electronic nose. Extra virgin olive oils (Ayvalık variety) were adulterated with 5, 10, 15 and 20% of sunflower, corn, soybean or hazelnut oils. The adulterated and non-adulterated oil samples were placed in septa-sealed screw-cap vials and the volatiles in the headspace were introduced to the electronic nose having a surface acoustic wave detector. Principal Component Analysis (PCA), Partial Least Square (PLS) regression analysis and Discriminant Function Analysis (DFA) were used as pattern recognition techniques and these techniques were performed using Simca and Statistica software programs. It was observed that electronic nose has been able to differentiate adulterated and non-adulterated extra virgin olive oils from each other very well.