



BIO-SUSTENTABILIDADE E BIO-SEGURANÇA ALIMENTAR, INOVAÇÃO E QUALIDADE ALIMENTAR

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Autores

Ofélia Anjos, Soraia I. Pedro, Carlos Antunes

Edição

Ofélia Anjos, Soraia I. Pedro, Natália Martins Roque, Carlos Antunes

Outros colaboradores:

Fátima Peres

Cecília Gouveia

Cláudia Adriana Fernandes Vitória

Ilustrações

Luísa Ferreira Nunes

Editor

Sociedade Portuguesa de Química

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Application of an electronic nose to differentiate extra virgin olive oils according to the geographical origin: Côa *versus* Douro regions

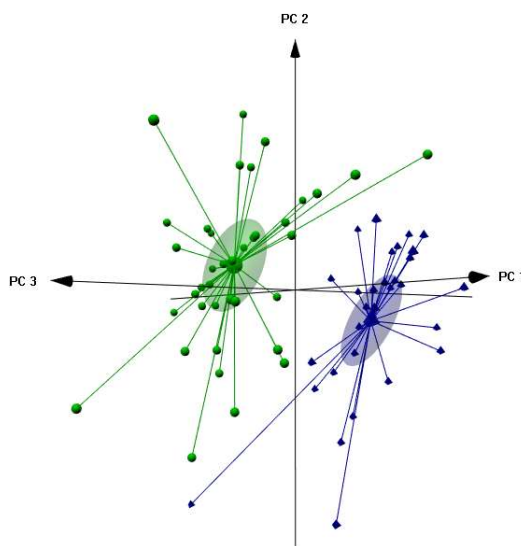
Ferreiro N,¹ Peres AM,¹ Veloso ACA,^{2,3} Pereira JA,¹ Rodrigues N,¹

¹ CIMO, Centro de Investigação de Montanha, Instituto Politécnico de Bragança, Campus Sta Apolónia, 5301-855 Bragança, Portugal; nunorodrigues@ipb.pt

² Instituto Politécnico de Coimbra, ISEC, DEQB, Rua Pedro Nunes, Quinta da Nora, 3030-199 Coimbra, Portugal

³ CEB/LABELS, Centre of Biological Engineering, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal

Olive oils produced in the Douro's region (north of Portugal) are greatly appreciated due to their specific chemical-sensory characteristics, which can be associated to the region's "Terroir". Thus, for olive oil producers and consumers, the capability to guarantee the authenticity of the geographical origin of these oils is of most importance. In this sense, this study aimed to evaluate the possibility of using an electronic nose (E-nose), with nine metal oxide semiconductors (MOS), as a non-invasive analytical tool to recognize the geographical origin of olive oils from two geographical sub-regions: "Côa" and "Douro". For each region, 40 different oils were collected, and the chemical quality (acidity, peroxide value and extinction coefficients) and sensory profiles were evaluated. From the initial samples, only those fulfilling the legal thresholds of extra virgin olive oil (EVOO) category were further used [1], being kept 38 and 31 different EVOO from "Côa" and "Douro" regions, respectively. For the majority of the oils, 9 olfactory attributes were perceived by the panellists (fruity – green or ripe; apple; banana; tomato and tomato leaves; dry fruits; cabbage; fresh and dry herbs) and 14 gustatory attributes (sweet; bitter; pungent; fruity – green or ripe; apple; banana; tomato and tomato leaves; dry fruits; cabbage; fresh and dry herbs; plum; olive leaves). Olive oils from "Douro" region were more sweet and had greater intensities of fruity-ripe, banana and dry herbs sensations. On the other hand, "Côa" olive oils were bitter and pungent showing higher intensities of fruity-green, tomato and tomato leaves, cabbage, fresh herbs and olive leaves sensations. Considering the differences perceived at the sensory level, namely at the olfactory profile, a lab-made E-nose [2] was applied. The results showed that this sensor-based device could identify the geographical origin of the studied olive oils. In fact, the principal component analysis (PCA) of the average response curve of the sensors' signals (resistance data) enabled a satisfactory unsupervised differentiation of the 69 olive oils according to the two geographical regions studied (Figure 1). The satisfactory performance could



be tentatively attributed to the abovementioned different olfactory profiles found for the oils, depending on their origin.

Figure 1: E-nose-MOS performance: 3D PCA plot (PC1: 61%; PC2: 23%; and, PC3: 4%) regarding the unsupervised differentiation of "Côa" olive oils (green filled regions) and "Douro" olive oils (blue filled triangles), based on the average resistance response curves of the 9 MOS sensors comprised on the sensor device.

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