Identification of volatiles responsible for typical aroma descriptors of the Catalan extra virgin olive oil PDOs

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INTRODUCTION

Sensory analysis is the only tool that can provide distinctive value to extra virgin olive oil (EVOO) produced all over the world [1, 2]. However, this subjective analysis sometimes is difficult to apply as olive oils only differ from each other in a narrow range of 2% regarding their minority composition. Moreover, this difference is even smaller if only aroma and flavour are considered [3].

EVOO aroma is composed of a complex set of so-called "odorants". These are volatile compounds able to interact with the receptors of the human nose, regardless of the fact that they belong to very different chemical families present at different concentrations. Most of these odorants are the same whatever the EVOO considered, so the differences between products are due to small differences in the concentration level and/or the presence/absence of a few aroma compounds. As a result, it can be difficult to establish an objective classification of EVOO only by means of a panel test.

Therefore, a specific analysis of the volatile composition carried out by means of an objective tool such as gas chromatography could be very helpful. It will allow stablishing not only if there are differences among EVOOs but also which compounds are really responsible for these differences. It has to be noted that, among these compounds, odorants will be the ones responsible for what the tasting panel perceives through sensory analysis.

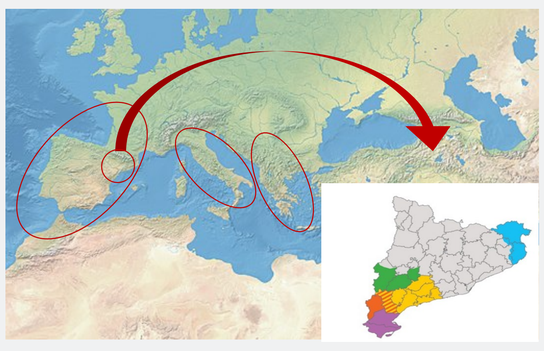
OBJECTIVE

To determine the aroma of EVOOs from different olive varieties and their relationship with the sensory descriptors evaluated by the Official Tasting Panel of Virgin Olive Oils of Catalonia [4] at 3 different stages:

- The aromatic characterization of these varieties by means of their characteristic aroma attributes
- The identification of those odorants responsible for the sensory descriptors related to mature olives
- The identification of the volatile compounds responsible for the characteristic attributes of the EVOOs produced under Catalan Protective Designation of Origin (PDO)

MATERIALS AND PROCEDURES

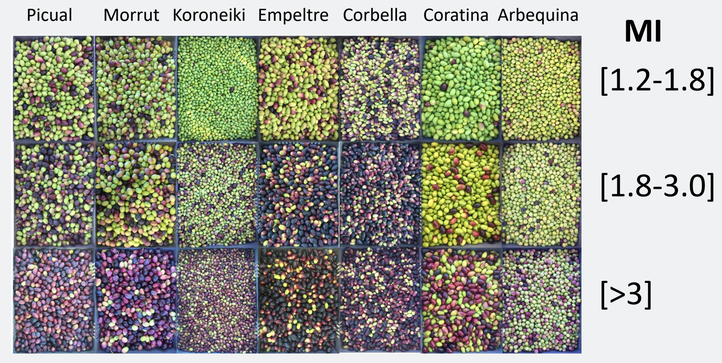
VARIETIES



A total of 7 very extended varieties in the Mediterranean basin will be studied. Three of them (Picual, Coratina and Koroneiki) are representative of the main olive oil producer countries (Spain, Italy and Greece), while Arebequina, Corbella, Empeltre and Morrut are important varieties in Catalonia.

EVOOs from these varieties will be sensory and chemically analysed according to their origin as well as along the maturity process of the olives.

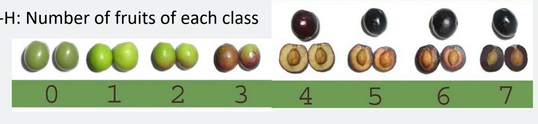
RIPENING



For three different harvest campaigns (21/22, 22/23 and 23/24), an olive tree of each variety will be collected at three different maturity times, separated by 21 days. The first harvest point for each variety will be stablished when its maturity index (MI) reaches a value between 1 and 2.

$$\text{Maturity index (MI)} = \frac{A \times 0 + B \times 1 + C \times 2 + D \times 3 + E \times 4 + F \times 5 + G \times 6 + H \times 7}{100}$$

A-H: Number of fruits of each class



PDOs

	Baix Ebre	Empordà	Terra Alta	Siurana	Garrigues
Grass	100	91	90	100	100
Green fruity	100	95	33	93	92
Almond	88	50	68	73	68
Exotic fruits	82	64	83	82	60
Walnut	53	86	95	69	80
Tomato	41	36	23	64	44
Artichoke	23	55	23	83	65
Berries	12	0	40	8	0
Leaves	0	32	11	0	0
Ripe fruity	0	5	67	7	8

IRTA database compiled from the sensory analysis of around 1,900 oils from the different Catalan Protected Designation of Origin (PDO) since 2011 will be standardized and studied. According to the information of this database regarding the maximum variability of the descriptors perceived by the Official Tasting Panel of Virgin Olive Oils of Catalonia, three sampling periods will be stablished for the different PDOs mills for the next harvest campaigns.

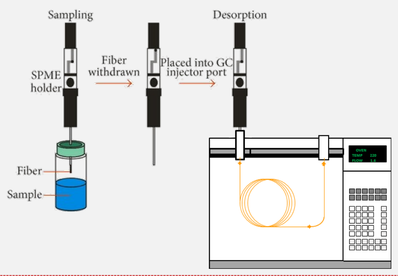
CHEMICAL & SENSORY ANALYSES

CHEMICAL ANALYSES

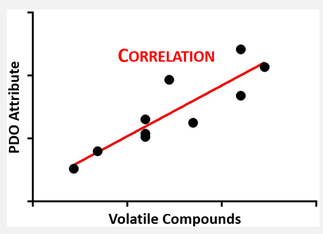
- Free acidity
- UV spectrophotometric evaluation: K_{232}, K_{270} and ΔK
- Peroxide value

CHROMATOGRAPHIC ANALYSES

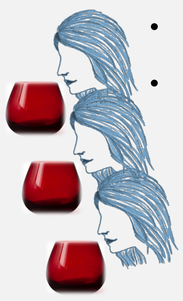
- Volatile extraction and concentration: HS-SPME
- Volatile separation and identification: GC-MS



STATISTICAL ANALYSES



SENSORY ANALYSES



- Official Tasting Panel (ISO 17205)
- Specific scoring sheet

EXPECTED RESULTS

To determine which odorants or volatile compounds are typical of each variety. This would allow identifying and characterizing the studied varieties.

To standardize some specific descriptors such as "ripe fruit" determining the specific odorants related to this aroma. This would provide a suitable tool for a better sensory evaluation of olive oils.

To corroborate the sensory descriptors and the values of the chemical parameters specified in the manual of each Catalan PDO in an objective and reliable way.

ACKNOWLEDGEMENTS

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[4] Official Tasting Panel of Vigin Olive Oils of Catalonia