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CONTRIBUTION FOR THE CHARACTERIZATION OF OLIVE OILS OF THE DOURO REGION (PORTUGAL)

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Introduction and Objectives

The "Douro Demarcated Region" in Portugal was the first demarcated and regulated wine region in the world, where the famous "Port Wine" is produced. In this region, ancient olive groves can be found in Douro hills and valleys, usually in small scattered plots, often abandoned, or above the vineyards in the slopes, benefiting from the region's climate. In recent years, olive oil production in Douro region has become an important source of income for Port wine companies, being considered one of the most precious food products of the region. In this sense, the present work aimed to characterize the physicochemical and sensorial attributes of the olive oils produced in the Douro region.

Materials and Methods

The work took place in two distinct years, 2014 and 2015, being each year collected 12 different olive oils samples from producers/packers of the Douro region where was determined:

Quality parameters
-Free Acidity;
-Peroxide Value;
-Specific extinction coefficients: -K_{232}; K_{270}; ΔK;
-Sensory attributes;

Chemical Composition
-Fatty acids profile
-Tocopherols contents:
-α-tocopherol;
-β-tocopherol;
-γ-tocopherol;

Results and Discussion

From the results obtained (Table 1) is possible to verify that minimum differences were found for quality parameters. Thus, for acidity the values varied between 0.19% and 0.38%, with lower averages in 2015 (0.22%) compared to 2014 (0.34%).

Table 1. Quality parameters (free acidity (% oleic acid); peroxide index (mEq.O_2/kg); K_{232}; K_{270} and sensory evaluation) of olive oils produced in the Douro region (Portugal): mean ± standard deviation, minimum and maximum values in brackets.

Quality parameters	2014 (n = 12)	2015 (n = 12)
Free Acidity (% oleic acid)	0.34±0.05 (0.28-0.38)	0.22±0.04 (0.19-0.33)
PV (mEq.O2/Kg)	3.01±0.66 (2.48-4.16)	8.37±2.42 (4.98-14.17)
K_{232}	1.36±0.34 (0.76-2.31)	1.92±0.78 (1.12-4.03)
K_{270}	0.12±0.03 (0.08-0.19)	0.17±0.05 (0.11-0.27)
Sensory Evaluation	EVOO	EVOO

In turn, the values observed in the peroxide index were much higher in 2015, with values varying between 4.98 and 14.17 mEq.O_2/kg, compared to the mean values observed in 2014 (3.01mEq.O_2/kg). These data pointed out that some of the olive oils samples studied presented an higher oxidation state, which was also be confirmed by the values of the specific extinction coefficients (K_{232} and K_{270}), which were generally grater in the olive oils of 2015 (Table 1), despite being all within the limits established for EVOO.

The olive oils' fatty acid profiles were very similar for both years (Figure 1). The average content of monounsaturated fatty acids was slightly higher in 2014 (76.5%) compared to 2015 (75.5%), ranging from 72.3% to 80.8%, followed by saturated fatty acids (with 15.1% and 15.7%, respectively in 2014 and 2015) and polyunsaturated fatty acids (with an average of 8.4% and 8.8% for 2014 and 2015 respectively).

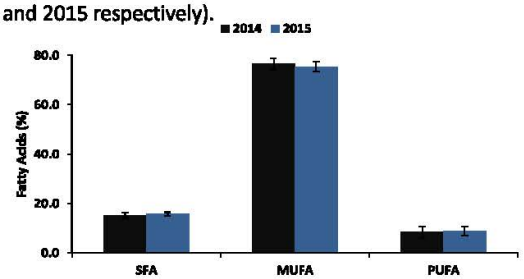

Figure 1. Saturated, monounsaturated and polyunsaturated fatty acids contents (expressed as a relative percentage within fatty acids) of olive oils produced in Douro Region (Portugal).

Figure 2 summarizes the minimum, maximum and mean values for the different isomers detected. In all olive oil samples, α-tocopherol was the major tocopherol found, being the levels higher for 2014, with mean values of 487.0 mg/kg, whereas lower values were determined for the year 2015 (mean values of 258.7 mg/kg). The remaining tocopherols detected (*i.e.*, β-tocopherol and γ-tocopherol) were present in much lower amounts. Higher total tocopherol contents were quantified in olive oils from 2014, with mean values of 518.5 mg/kg, whereas the lowest values were registered for the year 2015, with 263.8 mg/kg, in line with the slightly increased oxidation detected.

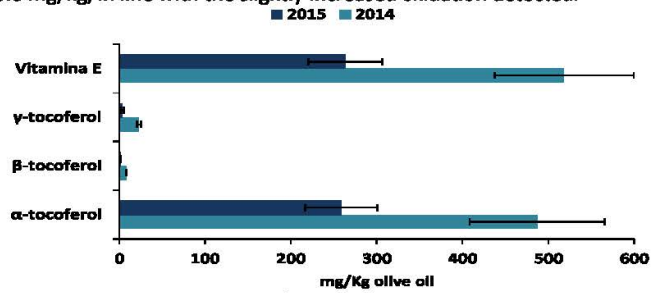

Figure 2. Tocopherols contents (expressed as mg/kg of olive oil) of olive oils produced in Douro region (Portugal).

CONCLUSION

The results obtained, although preliminary, may be viewed as a contribution to establish a physicochemical and sensory profile of the olive oils produced in the Douro valley region. The work allowed verifying the high quality of the olive oils produced in this region, the richness in some components with known important biological activities and a unique sensory fingerprint that may enable distinguishing these olive oils from those produced in other Portuguese regions.

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