Comparison between two organic extra virgin olive oils from Northern Portugal

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Introduction

Olive oil (OO) is a millennial product crucial for societal cohesion and local economies within the Mediterranean region, particularly in Portugal[1]. Epidemiological studies and multidisciplinary research have demonstrated that OO, used as the primary source of fat in the Mediterranean Diet, plays a crucial role in improving human health and reducing the risk of diseases, possessing anti-cancer, anti-inflammatory, antioxidant, cardioprotective and neuroprotective activities. These effects are attributable to OO composition rich in mono- (MUFAs) and poly-unsaturated fatty acids (PUFAs) and bioactive phenolic compounds[2]. These may differ depending on the olive cultivar type, soil management practices and production extraction technologies.

Objectives

In this context, the North of Portugal is a strong olive growing region of high economical significance.
Hence, this work aimed to assess the fatty acids composition and total phenolics content and profiles of two monovarietal olive oils, extracted from the Santulhana cultivar originated from two organic olive production systems.
This work also aimed to assess the antioxidant capacity of the two olive oils to be used as the OO selection factor for inclusion in a *quasi*-experimental study to study the OO impact on human individual nutritional status and blood biomarkers of nutritional and inflammatory status.

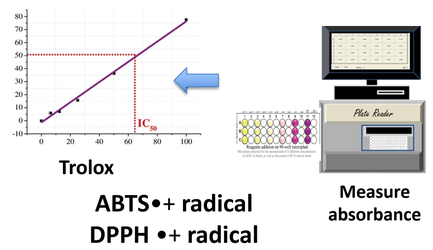
Methods

Two monovarietal (Santulhana) OO samples (15 mg) were collected, in duplicate, in January 2022 directly from local olive mills.

Sample Analysis:

- Fatty acids were analysed as fatty acid methyl esers by GC-FID.

- Total phenolic compounds (TPC): extraction from 1 g of OO in 2 mL of methanol:water (80:20), followed by analysis with Folin-Ciocalteu assay.
- The antioxidant capacity (radical scavenging activity) was determined by ABTS and DPPH assays.



Results and Discussion

Both OO samples – VFA and VFB - reveal similar total FA concentrations (1273.86 mg TFA/g and 1325.90 mg TFA/g olive oil for samples VFA and VFB, respectively) (Figure 1a).
Regarding the total abundances of SFA, MUFA and PUFA, the values shown in Figure 1b reveal that, as expected, the most abundant fraction are MUFAs (mainly oleic acid - C18:1 c9), followed by saturated fatty acids (mainly palmitic acid – C16:0) and PUFAs (mainly linoleic acid - C18:2 c9c12).
PUFA were almost three-fold higher in sample VFA than in sample VFB, whereas SFA were 30% higher in sample VFB than in sample VFA.

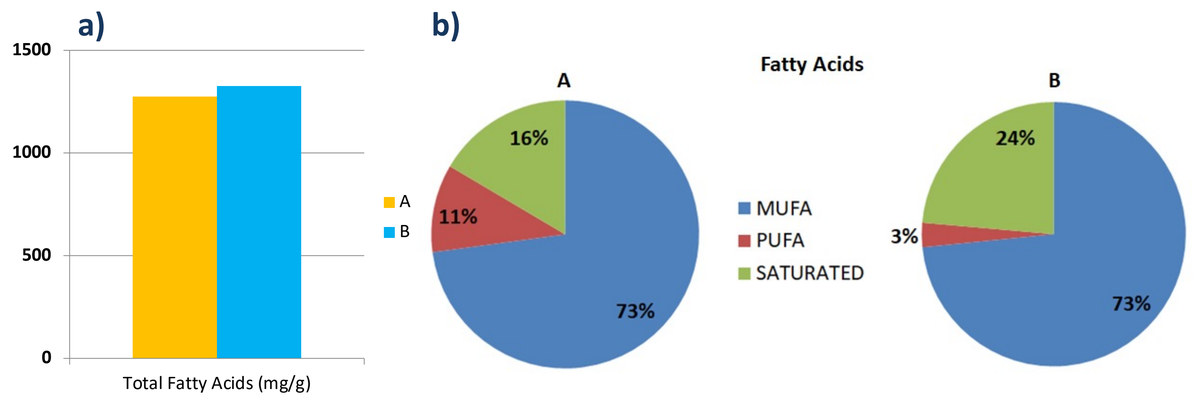


Figure 1 – Concentration (a) and fraction distribution (b) of total fatty acids for olive oil samples VFA and VFB.

The TPC and radical scavenging activity of the two monovarietal oils are shown in Figures 2a and 2b, respectively.

A significant sample origin effect was observed. TPC levels were in line with those reported in literature, although sample VFB stood out better with a TPC 2.5 times higher than sample VFA (561.5 µg GAE/g versus 224.9 µg GAE/g, respectively) (Figure 2a).

The above trend was also reflected in the OO antioxidant capacity, independently of the radical scavenging activity tested. Olive oil sample VFB showed a higher antioxidant capacity (8.36 versus 0.64 µmol Trolox/mg and 5.20 versus 0.67 µmol Trolox/mg for samples VFB versus VFA determined by ABTS and DPPH assays, respectively) (Figure 2b).

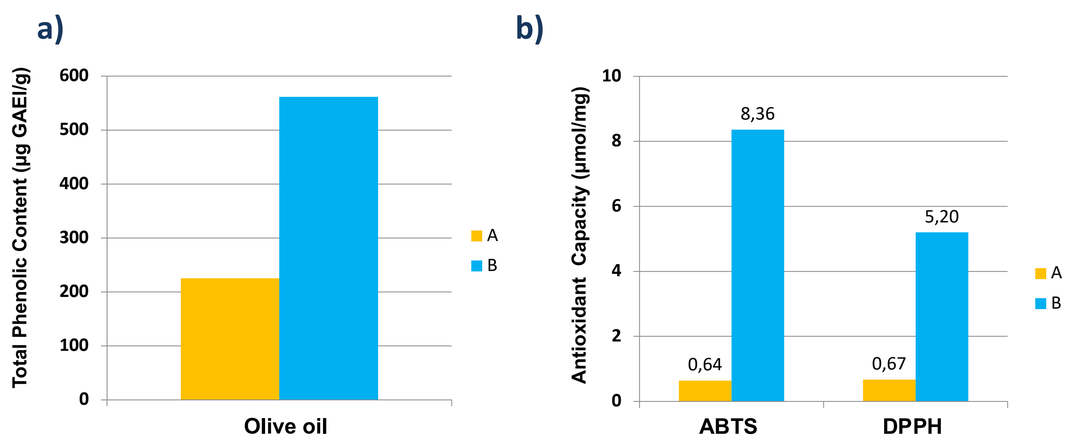


Figure 2 – Concentration of total phenolic compounds (a) and ABTS and DPPH radical scavenging activity for olive oil samples VFA and VFBB.

Conclusions

Olive oil composition regarding total fatty acids and phenolic compounds may vary within the same cultivar type depending on the associated soil management practices as well as the extraction procedures involved in OO production.

Similar monovarietal olive oils, but from different locations within the Trás-os-Montes region revealed different lipid and polyphenol profiles and antioxidant capacity. These significant differences in composition may lead to important differences in clinical outcomes.

References

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