

# Characterization of Three Monovariety Olive Oils of Beira Baixa (Portugal)

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**Keywords:** Galega, Bical, Cordovil, monounsaturated fatty acids, polyunsaturated fatty acids, oxidative stability

## Abstract

Beira Baixa olive oil is mainly produced with Galega cv. . Galega olive oil is very stable and provides flavour and taste that are traditional for Portuguese consumers. Bical and Cordovil de Castelo Branco cvs. are also important in the olive grove of the Region. The goal of this study is to understand the role of the composition of the three monovariety olive oils (mainly fatty acid composition and total phenol compounds) on the quality of Beira Baixa olive oil. Results for sterols are also shown.

## INTRODUCTION

Beira Baixa is an inland region situated in the centre of Portugal. The olive grove is the main crop of the Region, with three main cultivars of *Olea europaea* L.: Galega vulgar, Bical and Cordovil de Castelo Branco.

Oxidative stability, UV absorption at 270 and 232 nm, acidity, sterols, total phenol compounds, fatty acids and sensory analysis for monovariety olive oils produced in 1998/99 and 1999/00 were studied.

## MATERIALS AND METHODS

Olive fruits were picked in the first week of November in eight olive groves situated in the south area of Beira Baixa. Their ripeness indices were determined and they were immediately subjected to the Abencor extraction process (Pinheiro-Alves et al., 1989).

Acidity value, peroxide index, UV light absorption ( $K_{232}$  and  $K_{270}$ ), fatty acids, sterols and sensory analysis were carried out following the analytical methods described in Regulations EC/2568/91 and 1429/92 of EUC.

Evaluation of bitterness ( $K_{225}$ ) was carried out according to the method of Gutiérrez et al. (1992).

Stability and total phenol compounds were measured by Rancimat equipment (Gouveia, 1995) and by Folin-Ciocalteu reactive with SPE preparation of the sample solution (Favati et al., 1994).

## RESULTS AND DISCUSSION

UV light absorption at 270 and 232 nm and acidity were characteristic for monovariety olive oils extracted by Abencor equipment and are thus classified as extra virgin (Table 1).

Composition of monovariety olive oils differed on monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA); MUFA contents were higher for Galega and PUFA contents were higher for Bical and Cordovil (Table 2). Total sterols contents were higher for Galega and lower for Cordovil olive oils but  $\Delta$ -5-avenasterol contents were higher for Bical olive oils and lower for Galega olive oils (Table 3).

Stability depends on total phenol compounds mainly for Bical and Cordovil olive oils (Fig 1, 2). The results showed that Galega olive oils have higher stability, which is conferred by its characteristic acidic composition, rich in monounsaturated fatty acids.

Sensory analysis results showed that Bical and Cordovil olive oils are more bitter and pungent than Galega olive oils (Fig 3). These results are in accordance with bitterness evaluated by  $K_{225}$  (Fig 4).

## ACKNOWLEDGEMENTS

This work has been supported by Project PAMAF-IED- 6025. Thanks are due to Ana Claudia Conceição and Maria da Conceição Vitorino for technical assistance.

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## Tables

Table 1. Free fatty acid content (% oleic acid) and UV light absorption ( $K_{232}$  and  $K_{270}$ ) of Galega, Bical and Cordovil olive oils for 1998/99 and 1999/00 crop seasons.

	1998/99			1999/2000		
	Galega	Bical	Cordovil	Galega	Bical	Cordovil
Acidity (%)	0.35 <sup>a</sup>	0.38 <sup>a</sup>	0.24 <sup>a</sup>	0.21 <sup>a</sup>	0.24 <sup>a</sup>	0.19 <sup>a</sup>
	0.08 <sup>b</sup>	0.12 <sup>b</sup>	0.06 <sup>b</sup>	0.04 <sup>b</sup>	0.07 <sup>b</sup>	0.03 <sup>b</sup>
$K_{232}$	1.48 <sup>a</sup>	1.79 <sup>a</sup>	1.51 <sup>a</sup>	1.47 <sup>a</sup>	1.85 <sup>a</sup>	1.74 <sup>a</sup>
	0.18 <sup>b</sup>	0.27 <sup>b</sup>	0.15 <sup>b</sup>	0.06 <sup>b</sup>	0.39 <sup>b</sup>	0.29 <sup>b</sup>
$K_{270}$	0.10 <sup>a</sup>	0.13 <sup>a</sup>	0.11 <sup>a</sup>	0.09 <sup>a</sup>	0.13 <sup>a</sup>	0.12 <sup>a</sup>
	0.03 <sup>b</sup>	0.02 <sup>b</sup>	0.02 <sup>b</sup>	0.02 <sup>b</sup>	0.03 <sup>b</sup>	0.02 <sup>b</sup>

<sup>a</sup> Mean. <sup>b</sup> Standard deviation

Table 2. Monounsaturated (MUFA), polyunsaturated (PUFA) and saturated (SFA) fatty acids (%) of Galega, Bical and Cordovil olive oils for 1998/99 and 1999/00 crop seasons.

	1998/99			1999/2000		
	Galega	Bical	Cordovil	Galega	Bical	Cordovil
MUFA (%)	76.5 <sup>a</sup>	63.7 <sup>a</sup>	66.0 <sup>a</sup>	77.5 <sup>a</sup>	69.4 <sup>a</sup>	67.6 <sup>a</sup>
	1.4 <sup>b</sup>	2.5 <sup>b</sup>	3.3 <sup>b</sup>	0.8 <sup>b</sup>	1.9 <sup>b</sup>	2.5 <sup>b</sup>
PUFA (%)	5.8 <sup>a</sup>	17.4 <sup>a</sup>	16.4 <sup>a</sup>	5.4 <sup>a</sup>	13.4 <sup>a</sup>	15.3 <sup>a</sup>
	0.7 <sup>b</sup>	1.9 <sup>b</sup>	2.6 <sup>b</sup>	0.5 <sup>b</sup>	1.4 <sup>b</sup>	2.1 <sup>b</sup>
SFA (%)	17.6 <sup>a</sup>	18.8 <sup>a</sup>	17.5 <sup>a</sup>	17.1 <sup>a</sup>	17.2 <sup>a</sup>	16.9 <sup>a</sup>
	1.0 <sup>b</sup>	0.6 <sup>b</sup>	0.8 <sup>b</sup>	0.6 <sup>b</sup>	0.6 <sup>b</sup>	0.7 <sup>b</sup>

<sup>a</sup> Mean. <sup>b</sup> Standard deviation

Table 3. Sterol composition of Galega, Bical and Cordovil olive oils for 1998/99 and 1999/00 crop seasons.

Sterol Composition	1998/99			1999/2000		
	Galega	Bical	Cordovil	Galega	Bical	Cordovil
Campesterol (%)	2.8 <sup>a</sup>	2.1 <sup>a</sup>	2.8 <sup>a</sup>	3.0 <sup>a</sup>	2.1 <sup>a</sup>	2.6 <sup>a</sup>
	0.18 <sup>b</sup>	0.19 <sup>b</sup>	0.25 <sup>b</sup>	0.20 <sup>b</sup>	0.18 <sup>b</sup>	0.29 <sup>b</sup>
Estigmasterol (%)	1.2 <sup>a</sup>	1.2 <sup>a</sup>	1.5 <sup>a</sup>	0.6 <sup>a</sup>	0.7 <sup>a</sup>	0.9 <sup>a</sup>
	0.27 <sup>b</sup>	0.49 <sup>b</sup>	0.57 <sup>b</sup>	0.19 <sup>b</sup>	0.30 <sup>b</sup>	0.26 <sup>b</sup>
β-Sitosterol (%)	94.9 <sup>a</sup>	95.5 <sup>a</sup>	94.4 <sup>a</sup>	95.0 <sup>a</sup>	95.6 <sup>a</sup>	95.0 <sup>a</sup>
	0.36 <sup>b</sup>	0.62 <sup>b</sup>	0.77 <sup>b</sup>	0.37 <sup>b</sup>	0.55 <sup>b</sup>	0.46 <sup>b</sup>
Δ <sub>5</sub> Avenasterol (%)	5.9 <sup>a</sup>	11.5 <sup>a</sup>	9.4 <sup>a</sup>	7.2 <sup>a</sup>	14.3 <sup>a</sup>	10.2 <sup>a</sup>
	0.58 <sup>b</sup>	1.07 <sup>b</sup>	1.33 <sup>b</sup>	1.44 <sup>b</sup>	1.96 <sup>b</sup>	3.34 <sup>b</sup>
Total Sterols (mg/Kg)	2231 <sup>a</sup>	2116 <sup>a</sup>	1251 <sup>a</sup>	2049 <sup>a</sup>	1800 <sup>a</sup>	1417 <sup>a</sup>
	378.3 <sup>b</sup>	190.0 <sup>b</sup>	154.3 <sup>b</sup>	446.7 <sup>b</sup>	170.9 <sup>b</sup>	244.2 <sup>b</sup>

<sup>a</sup> Mean. <sup>b</sup> Standard deviation

## Figures

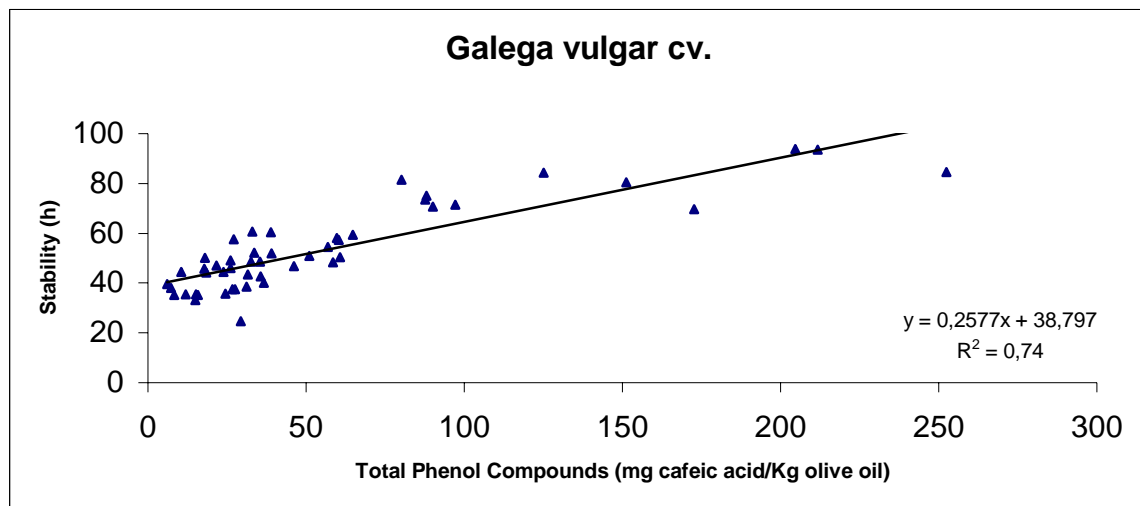


Fig. 1. Total phenol compounds vs. oxidative stability for Galega olive oils, 1997/98 to 1999/00 crop seasons.

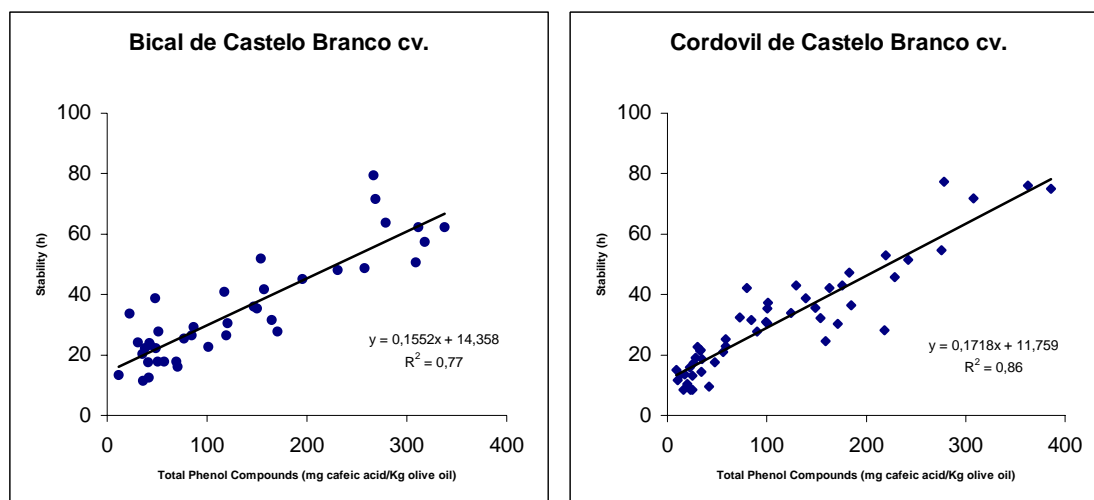


Fig. 2. Total phenol compounds vs. oxidative stability for Bical and Cordovil olive oils, 1997/98 to 1999/00 crop seasons.

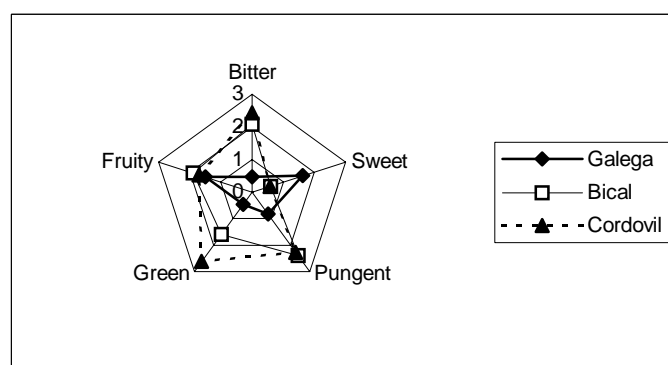


Fig. 3. Sensory analysis (positive attributes) for Galega, Bical and Cordovil olive oils, 1999/00 crop season.

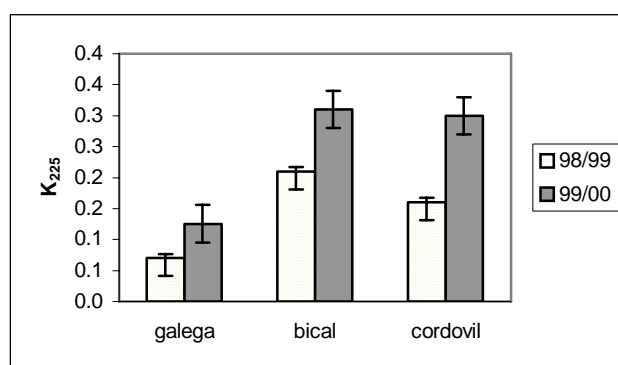


Fig. 4. Extinction coefficients at 225nm ( $K_{225}$ ) for Galega, Bical and Cordovil olive oils, 1998/99 and 1999/00 crop seasons.