Olive Ripening and Harvest Time in Portuguese Cultivars of "Beira Interior" Region

A. Ramos and F. Peres
Escola Superior Agrária
de Castelo Branco, IPCB
Castelo Branco, Portugal

P. Simões-Lopes and M. C. Pinheiro-Alves
Estação Nacional de Melhoramento de Plantas
Departamento de Olivicultura, INIAP
Elvas, Portugal

Keywords: ripening index, oil content

Abstract

Portuguese growers of "Beira Interior", an inland region in the centre of Portugal, start harvesting olives only in late November or December and finish in January and sometimes February. Studies on olive ripening carried out in different groves showed that, in general, oil content (% d.w.) stabilises during November and ripening index rises regularly throughout the sampling period. However, there were some differences among cultivars. The results suggest that harvest can begin from mid--October to the 1st fortnight of November, according to location, for 'Galega', in the 1st fortnight of December for 'Bical', in the 1st fortnight of November for 'Carrasquinha' and in the 2nd fortnight of November for 'Cornicabra', therefore harvest time should begin long before the traditional time.

INTRODUCTION

One of the factors affecting olive oil quality is olive ripening (Maestro-Duran, 1990). Late harvesting may cause volatile fraction (Angerosa, 2002), pigment and total phenol decreases (Aparicio and Luna, 2002). Furthermore, fruit falling and the development of both pests and diseases may also increase. If fruits are harvested too early, oil content may be lower (Aparicio and Luna, 2002). Moreover, according to Angerosa (2002) virgin olive oil is characterised by very high strengths of bitter and pungent attributes. The most common ripening index, developed in "Estación de Olivicultura y Elaiotecnia" of Jaen (Spain), is based on fruit colour evolution (Hermoso et al., 1997). In general, a ripening index of 3.5 coincides with the oil content (% d.w.) stabilization and is a good indicator for harvest time (Hermoso et al., 1997).

Portuguese growers of "Beira Interior", an inland region in the centre of Portugal, start harvesting olives only in late November or December and finish in January and, sometimes, February. Some studies on olive ripening were carried out in this region, but without establishing the harvest time. This study aims to relate olive ripening with harvest time in some cultivars in different groves of the above-mentioned region.

MATERIAL AND METHODS

Olive samples

Olives from four different cultivars ('Galega', 'Bical', 'Carrasquinha' and 'Cornicabra') were harvested every fortnight from mid-October to mid-December in different olive groves in "Beira Interior" (Fig. 1) from 2001 to 2003.

Analytical methods

Samples were subjected to dryness at 105ºC ± 2ºC, until constant weight, in order to evaluate their moisture content. Oil content was measured by nuclear magnetic resonance (NMR) using Oxford 4000 equipment, following the methodologies described in previous paper (Pinheiro-Alves and Gusmão, 1994). The ripening index of

fruits was calculated using the method of "Estación de Olivicultura y Elaiotecnia", Jaen, Spain (Hermoso et al., 1997).

Statistical analysis

Statistical analysis was performed by SPSS 12 software, considering each harvest year a replication. Differences were considered statistically significant when probability was greater than 95% ($p \leq 0.05$).

RESULTS AND DISCUSSION

In general, oil content (% d.w.) stabilises during November and ripening index rises regularly throughout the sampling period (Figs. 2-5; Tab. 1). However, there were some differences among cultivars.

In 'Galega', oil content (% d.w.) did not increase significantly from the 2nd fortnight of November onwards (Fig. 2; Tab. 1), but there was a significant interaction between sampling period and location. Ripening index in this cultivar was above 3.5 in different timings for each location, in some cases even before the beginning of the sampling period.

In 'Bical', oil content (% d.w.) did not increase significantly throughout the sampling period, but the ripening index only reached 3.5 in the 1st fortnight of December (Fig. 3; Tab. 1).

Oil content (% d.w.) did not increase significantly from the 1st fortnight of November onwards in 'Carrasquinha' (Fig. 4) and from the 2nd fortnight of November onwards in 'Cornicabra' (Fig. 5). In these cultivars, the ripening index was above 3.5 at the same time (Figs. 4-5; Tab. 1). No significant interaction was found between sampling period and location.

CONCLUSIONS

The results suggest that harvest can begin from mid-October to the 1st fortnight of November, according to location, for 'Galega', in the 1st fortnight of December; for 'Bical', in the 1st fortnight of November; for 'Carrasquinha' and in the 2nd fortnight of November for 'Cornicabra'. Therefore, harvest time should start earlier than what usually happens in Beira Interior.

Increase in oil content (% f.w.), due to the decrease in water content (Figs. 2-5), could explain the trend for late harvest.

ACKNOWLEDGEMENTS

This research was funded by Project Agro 91.

Literature Cited

Angerosa, F.2002. Influence of volatile compounds on virgin olive oil quality evaluated by analytical approaches and sensor panels. Eur. J. Lipid Sci. Technol. 104: 639-660.

Aparício, R & Luna, G.2002.Characterisation of monovarietal virgin olive oils . Eur. J. Lipid Sci. Technol. 104: 614-627.

Hermoso, M., Uceda, M., Frias, L. and Beltran, G. 1997. Maduración. p. 139-153. In: D. Barranco, D. Fernandez-Escobar and L. Rallo (eds.), El Cultivo del Olivo, Ediciones Mundi-Prensa, Madrid.

Maestro-Durán, R. 1990. Relationship between the composition and ripening of the olive and quality of the oil. Acta Hort. 286: 441-451.

Pinheiro-Alves, M.C. and Gusmão, L. 1994. Use of nuclear magnetic resonance for the determination of total fat content of olive pastes. 2nd International Conference on Applications of Magnetic Resonance in Food Science. Aveiro, Portugal, 19-21.

Tables

Table 1. Results of oil content (% d.w.) and ripening index evolution from mid-October to mid-December (mean of all groves)

	'Galega'		'Bical'		'Carrasquinha'		'Cornicabra'	
	Oil content (%d.w.)	Ripening index	Oil content (%d.w.)	Ripening index	Oil content (%d.w.)	Ripening index	Oil content (%d.w.)	Ripening index
2nd half October	33.88a	3.0a	40.37a	1.6a	34.14	1.5a	29.25a	0.6a
1st half November	36.81b	4.1b	38.01a	2.7a	38.88ab	3.4b	33.80b	3.0b
2nd half November	37.91bc	4.6c	40.32a	2.8a	38.69ab	3.9c	36.92c	3.8c
1st half December	39.86c	5.8b	42.88a	3.8a	42.02b	4.6d	36.94c	4.6d

Values in the same column with different letters are significantly different ($p \leq 0.05$)

Figures

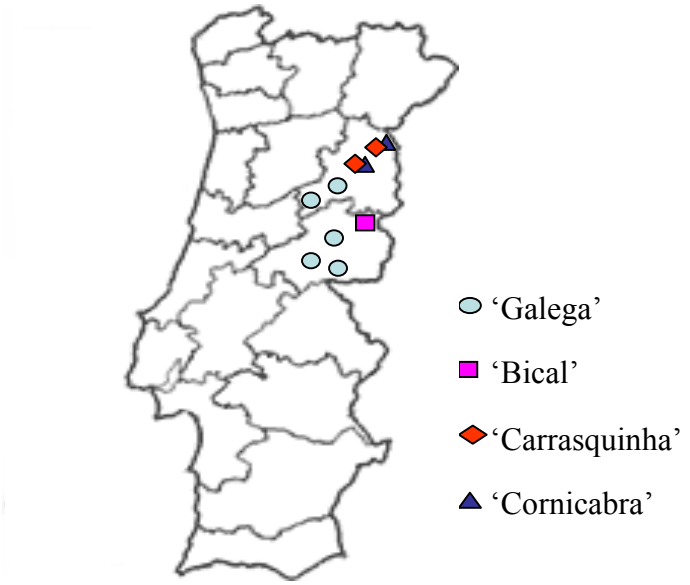

Fig. 1 – Groves and cultivars distribution in "Beira Interior", Portugal

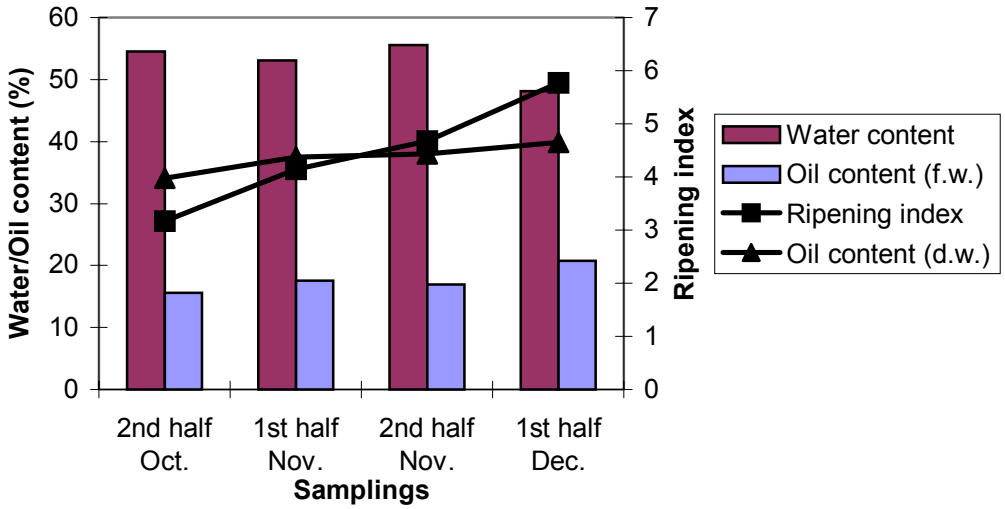

Fig. 2 – Water and oil content (fresh and dry weight) and ripening index for 'Galega'

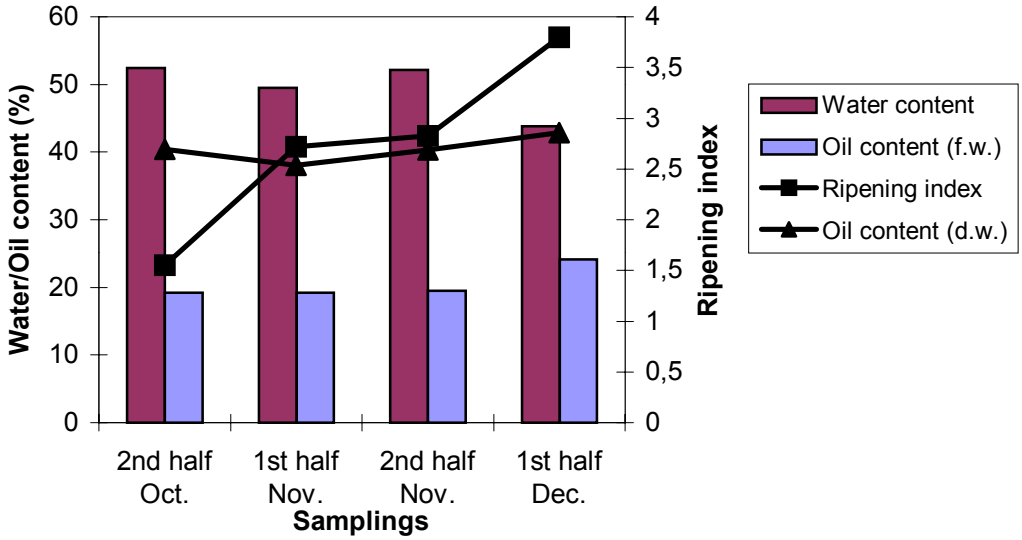

Fig. 3 – Water and oil content (fresh and dry weight) and ripening index for 'Bical'

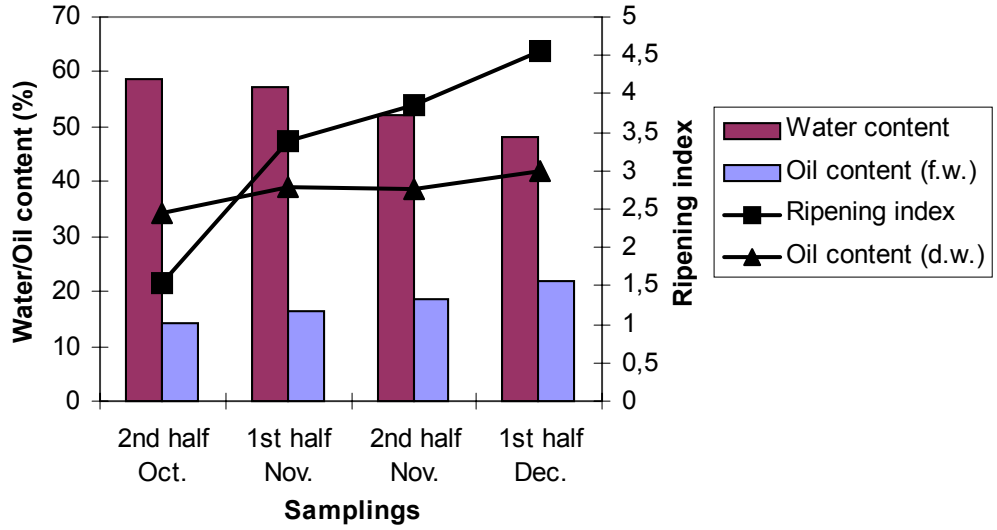

Fig. 4 – Water and oil content (fresh and dry weight) and ripening index for 'Carrasquinha'

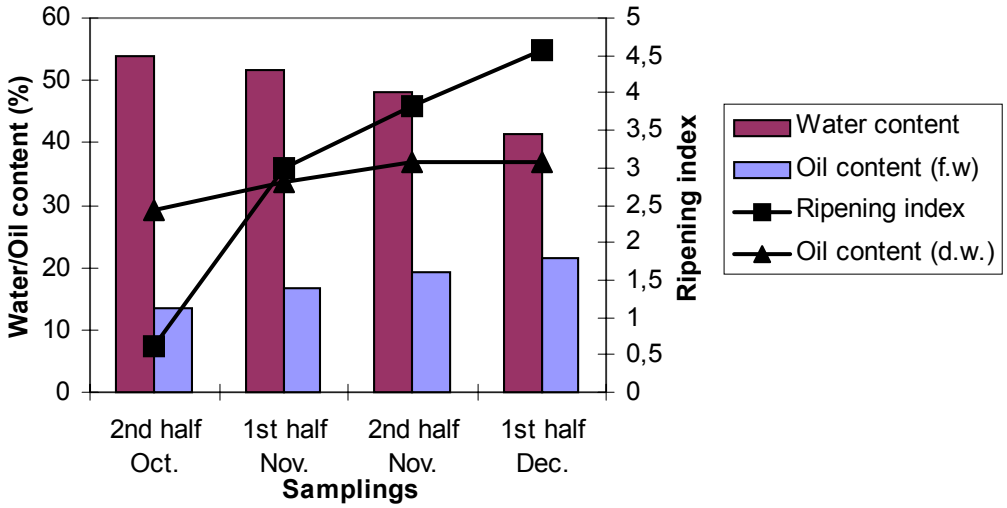

Fig. 5 – Water and oil content (fresh and dry weight) and ripening index for 'Cornicabra'