Variability in almond oil chemical traits from traditional cultivars from eastern Morocco

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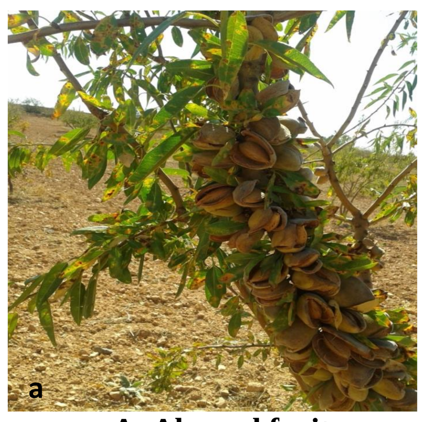
Introduction

Almond tree "*Prunus dulcis*" is a fruit tree that belongs to the Rosaceae family. Thanks to the ability of enduring high water deficits, this tree has been cultivated for centuries in Morocco, it plays an important socio-economic and ecologic role: it gives million work days and it even participates in the soil fixation. In 2012, almond tree covered an area of 153000 ha. Sweet almond oil is obtained from the dried kernel of the plant. It is almost insoluble in alcohol but readily soluble in chloroform or ether. It is also used as a substitute for olive oil because it exhibits similar carrier properties (Ahmad, 2010).
The aim of this study is not only to characterize sweet almond oils (AO) extracted mechanically from five most important varieties (Marcona (Mr), Fournat (FN), Ferragnes/ Ferraduel (F/F) and Beldi (B)) but also to compare them with Autochthonous cultivar Olive oil (OO) *Picholine Marocaine*. All this varieties were cultivated in Eastern Morocco

Materials & Methods

Samples of sweet Almonds (Crop years 2014/2015) of five varieties were collected from Sidi Bouhria“ region in eastern Morocco.
The extraction of almond Oil (AO) was realized by screw press Komet (model DD85G, Germany) in PRODIGIA Company in Casablanca.
Oil yield was calculated from the difference between almond weight and AO weight obtained by mechanical extraction.
Fatty acid (FA) composition: FAs were analyzed by a HP 5880 A series GC System chromatograph, equipped with a capillary column (25m x 0.25mm x 0.26µm) and a FID detector.
O/L ratio was calculated from Oleic and Linoleic FA percentages.
Oxidative stability indices (OSI) of AO were evaluated by Rancimat model 743, Metrohm, Switzerland with an air flow rate of 15L/h and with a maintained temperature of 100°C at the heating block.



A: Almond fruit

B: Almond fruit


C: Mechanic extraction from almond kernel


D: Almond oil extraction

Results and discussion

Table 1. Physico-chemical parameters and Fatty acid profile of almond oil during tow consecutive crop years and comparison with olive oil

	Crop year 2014				Crop year 2015				Olive oil Picholine Marocaine
Profile	Mr	Fn	F/F	B	Mr	Fn	F/F	B	
Oil yield %	38,872 ± 1,88a	52,404 ± 2,667c	48,155 ± 1,78b	48,818 ± 2,01b	35,548 ± 0,89a	45,224 ± 1,43b	49,853 ± 0,46c	49,361 ± 0,56c	30,000
C16	8,481 ± 0,13	7,327 ± 0,09	7,4487 ± 1,02	8,357 ± 0,02	8,4004 ± 0,99	8,087 ± 0,022	7,2287 ± 0,494	8,239 ± 0,772	15,93**
C 18	2,798 ± 0,08	2,000 ± 0,04	2,083 ± 0,07	1,808 ± 0,16	3,232 ± 0,23	3,197 ± 0,00	2,347 ± 0,12	2,24 ± 0,202	1,6**
C 18: 1	57,867 ± 0,22	65,534 ± 0,8	64,719 ± 1,34	60,407 ± 0,66	57,542 ± 0,13	58,476 ± 0,04	70,33 ± 2,147	62,094 ± 0,926	67,49**
C 18: 2	29,7 ± 0,35	24,845 ± 0,49	24,346 ± 0,87	24,741 ± 1,17	29,807 ± 1,31	29,101 ± 0,01	19,4507 ± 0,08	26,755 ± 1,28	12,85**
SFA	11,230	9,327	9,531	10,165	11,632	11,284	9,575	10,480	17,53**
MUFA	57,867	65,534	64,719	60,407	57,542	58,476	70,330	62,094	68,69**
PUFA	29,700	24,845	24,346	24,741	29,807	29,101	19,451	26,755	13,87**
O/L	1,950	2,640	2,660	2,440	1,930	2,009	3,610	2,320	5,25**
OSI (h)	21,31 ± 0,03b	25,47 ± 0,16c	27,22 ± 0,714d	12,45 ± 0,85a	21 ± 0,08b	20,54 ± 1,838b	29,085 ±0,11c	7,957 ± 0,263a	43,55**

Significant differences in the same row are shown by different letters (a–d) varieties ($p<0.05$) SFA: Saturated Fatty Acid, MUFA: Monounsaturated Fatty Acid; PUFA: Polyunsaturated Fatty Acid
** (Mansouri et al 2013)

The AO ended up being the highest oil yield comparing with OO which allows almond to be used in many oil industries.
F/F's AO had been the most stable among the three others, due to its high O/L ratio which gives idea about oil stability. This characteristic was confirmed by the oxidative stability indices which carried out by Rancimat test.

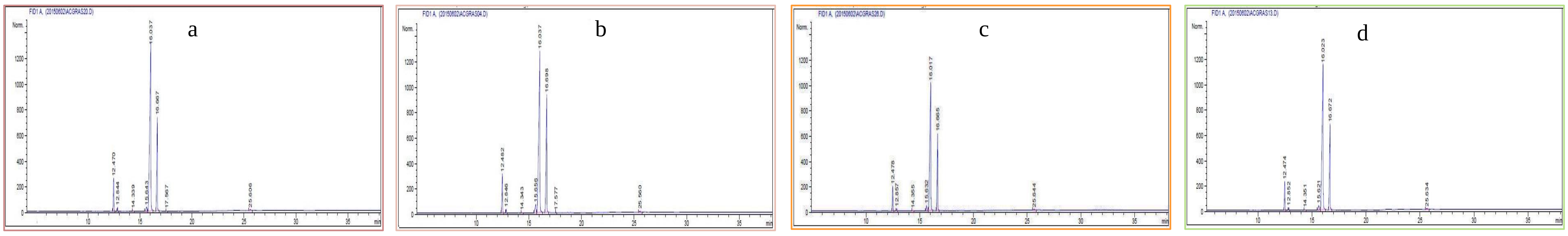


Fig 1 . Fatty acid chromatograms example (crop year 2014) of analyzed varieties : *Beldi* (a), *Marcona* (b), *Ferragnes/Ferraduel* (c) et *Fournat* (d)

Conclusion

In spite of the fatty acid profile AO and OO are dominated by Oleic acid C18:1 (more than 55%), the OO oxidative stability is very high than that of AO. This difference is not only due to AO's richness of polyunsaturated fatty acid and its poorness of saturated fatty acid but also its due to the antioxidant activity. This fragility does not allows its use for cooking or for storing for a long period. However, almond oils could have many applications in the food industry as well as in cosmetic.

References

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