Characterization of almond kernel oils of five almonds varieties cultivated in Eastern Morocco

[1,4]Houmy N., [1]Mansouri F., [1]Ben-moumen A., [2]Elmoudden S. [3]Boujnah M., [4]Sindic M., [4]Fauconnier M-L., [1]Serghini-Caid H., [1]Elamrani A.
[1] Laboratoire de Biologie des plantes et des micro-organismes, Faculté des Sciences, UMP, Oujda; Maroc
[2] CTB-Belge -DPA-DRA Oriental Oujda.
[3] Laboratoire de technologie alimentaire, centre de régional de recherche agronomique de Rabat, INRA Maroc
[4] Laboratoire Qualité et Sécurité des Produits Alimentaires et Unité de Chimie Générale et Organique, Gembloux Agro-Bio Tech, Ulg, Belgique.
Corresponding author*: houmy.nadia@gmail.com*

Introduction

Almonds have a significant economical importance for the whole Mediterranean area. In the last years, a marked improvement in production is observed and competition among productive zones have hardened the commercialization of this product.
Almond kernel contains unsaturated fatty acids that play a significant role for human nutrition, on the other hand, almond oil is very appreciated for alternative medicine, cosmetics, etc. Thus, obtaining the almond oil may be an option for expanding the almond market. The aim of the present study is to achieve characterization, on the basis of their triglyceride and fatty acid compositions, of sweet almond oils extracted mechanically from five most important varieties (*Marcona, Fournat, Ferragnes, Ferraduel and Beldi*) cultivated in Eastern Morocco, and in this way to find keys for the classification of almond cultivars into groups of similar features.

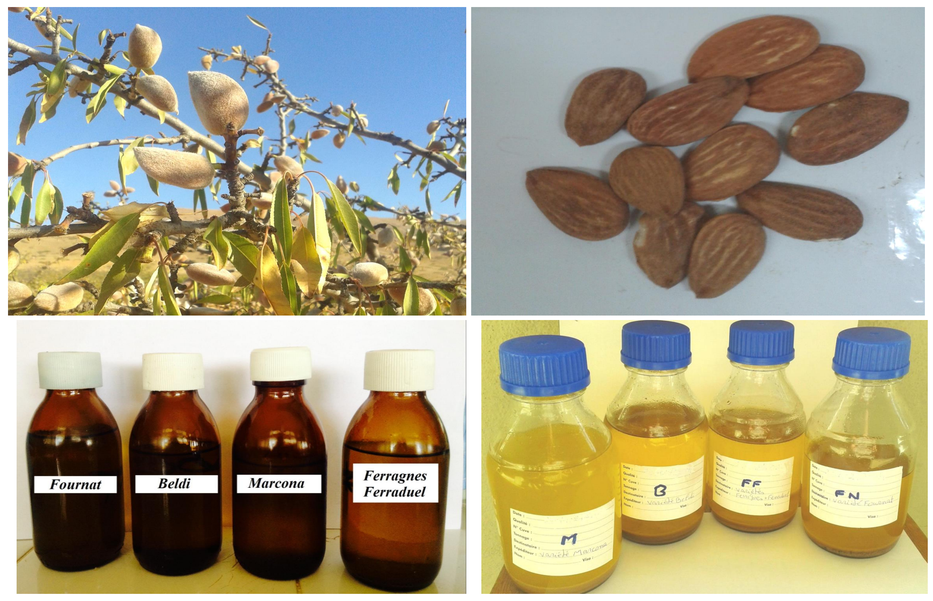
Materials & Methods

Samples of sweet Almonds (Crop year 2013) were obtained from cooperative "AMANDES-Sidi Bouhria“ sis eastern Morocco.
- Extraction of almond Oil (AO), was realized by screw press Komet (model DD85G, Germany) in a Company (PRODIGIA, Casablanca).
- Acidity, peroxide values and UV absorption indices (K232, K270) were determined according to commercial standard methods for olive oil (IOOC, 2001).
- Iodine values (IV) were calculated from fatty acid percentages (Torres and Maestri, 2006; Maestri et al., 2014) by using the following formula: IV = (% Palmitoleic acid x 1,001) + (% oleic acid x 0,899) + (% linoleic acid x 1,814).
- 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.
- Triacylglycerol (TAG) analysis was determined by HPLC system. The mobile phase consisted of acetone/acetonitile (60/40; V/V)). HPLC analyses were conducted using C18 reversed- phase column (ODS C18: 250× 5mm, 5µm).
- Oxidative stability indices (OSI) of AO were evaluated by Rancimat model 743, Metrohm, Switzerland with an air flow rate of 15L/h and temperature of the heating block maintained at 100°C.

Results

Table 1. Oil contents and physicochemical characteristics of analyzed almond oils

	Almond varieties			
Parameters	**Mr**	**Fn**	**F/F**	**Be**
Oil (%)*	61.62 ±1.4	48.62 ± 2.1	58.99 ±1.1	61.00 ±1.7
AV	0.81 ± 0.008	0.88 ± 0.005	0.88 ±0.004	0.77 ± 0.009
PV	14.32 ± 0.41	6.43 ± 2.73	8.13 ± 2.81	16.39 ± 2.95
K_{232}	1.54 ± 0.20a	3.53± 0.11b	1.33 ± 0.14c	2.29 ± 0.030d
K_{270}	0.073 ± 0.004a	0.129± 0.005b	0.053 ± 0.006c	0.088 ± 0.003d
IV	102.25 ± 0.13	103.90 ± 0.16	98.42 ± 0.11	98.97± 0.25
OSI (h)	20.28 ± 0.45a	21.22 ± 3.31a	27.55 ± 0.714b	23.5 ± 0.62a



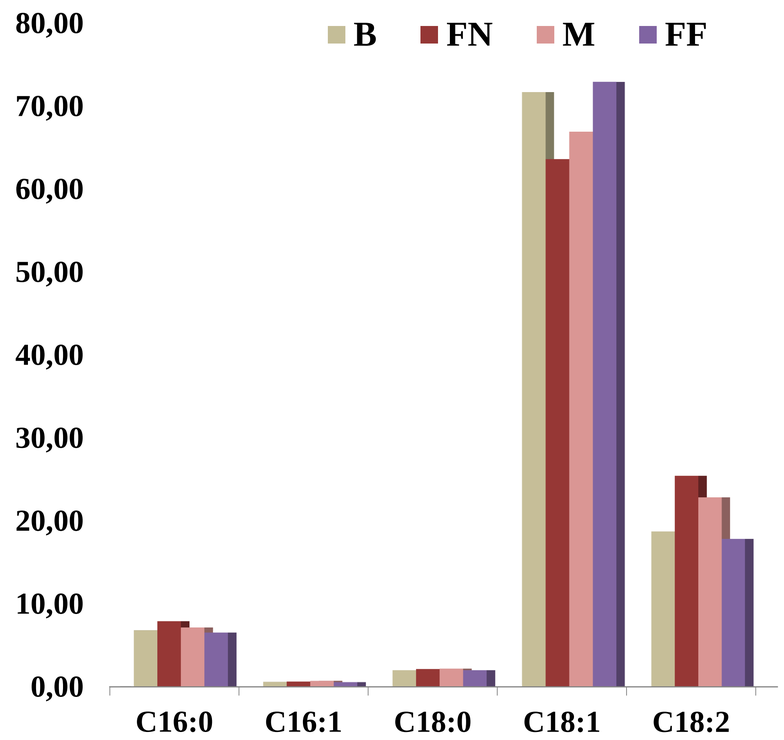


Figure 1: Fatty acid Composition of Almond Oils analyzed by GC
B, FN, M, FF, respectively , stand for : *Beldi, Fournat, Marcona and Ferragnes-Ferraduel*

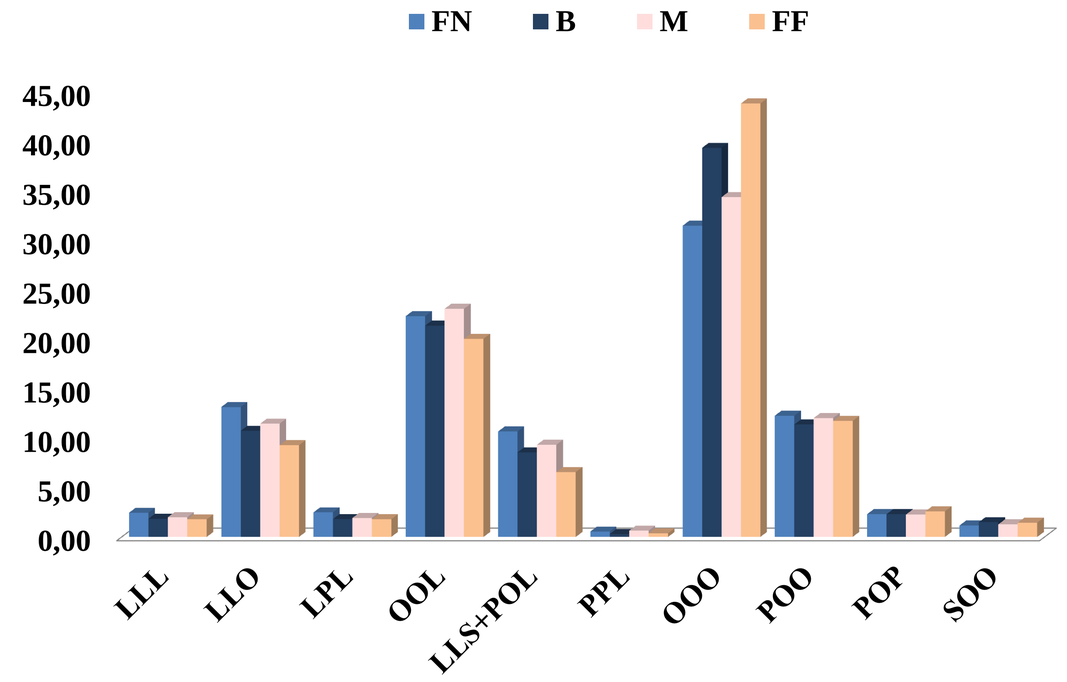


Figure 2: Triglyceride Composition of Almond Oils analyzed by HPLC
L, O, P, S respectively for Linoleoyl, Oleoyl, Palmitoyl, and Stearoyl FA radicals

Conclusion

According to their FA compositions and their TAG profiles, we can conclude that the high level of PUFA gives to AO less OSI, but there is other parameter responsible for variation of OS which is richness in minor components, such as tocopherols.
The fragility of AOs due to their high unsaturated fatty acid does not allow their storage for long period and their use for cooking, but these natural oils have many applications in the food industry as cosmetic field