

Influence of Growing Region in the Quality of Olive Oils Produced in Albania in 2012-2013



Biotechnology

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Abstract

Albania as part of the Mediterranean basin, with a favourable geographic position has been part of the zone where olive growing varieties are autochthonous. The growing regions of olives in Albania have a possibility to develop the olive oil industry, a possibility to develop the economy. This study aims the evaluation of chemical and sensorial criteria in extra virgin olive oils of autochthonous cultivars examined during the harvesting period 2012-2013 in Berat, Lezhe, Elbasan and Vlore regions. Each sample of extra virgin olive oil was representative of olive trees from one variety. The extraction was made using continuous extraction systems (Olerina 40, capacity 5-10 kg), at the Oil Laboratory of the Faculty of Biotechnology and Food, Agricultural University of Tirana. The determination of chemical and sensorial criteria were done according to the European Commission Regulation EEC/2565/91. The characteristics of the cultivar are very important in the quality and the components of the olive oil. One of the factors which influence this characteristics is the region. The data of all parameters analyzed demonstrated that all olive oils produced by autochthonous cultivar belonging to each region are extra virgin. Riche in polyphenols Kalinjot 280 (mg/l caffeic acid).

1. Introduction

The olive oil, a component in the Albanian gastronomic recipes. A healthy product. The consumption of olive oil reduces the cardiovascular problems. The project 2009-2012 of Albanian Government to increase the surface of olive trees and autochthonous varieties as possibility of: a rural development, an economic development, a development of the olive oil industry. [1] Kalinjot is a local olive cultivar taking up the most olive-growing area in all olive trees orchards. Among these cultivars, Kalinjot is graded as the first regarding the tree population (around 45 percent) and oil production, Kokerrmadhi I Elbasanit is positioned posterior to the Kalinjot with percentage, Kallmet and Nisan are the last. [2]

Quantity and quality of substances existing in olive oil such as fatty acids, phenols, chlorophyll and carotenoids are affected by various factors: olive cultivar, the region, the climatic conditions, ripening stage and the extraction methods. [3] [8] The importance of harvest year has been demonstrated by relating the content of phenol compounds and the quality of olive oils [4] [5] [6]. The natural phenol antioxidants are supposed to have chemo protective properties in human beings [5] and also to contribute to the sensorial properties of virgin olive oil [8]. The total phenols are very important for the quality of extra virgin olive oil, because of their involvement in its resistance to oxidation, bitterness and pungency of olive oil taste [7]. This study aims the evaluation of four autochthonous cultivars for each region from the 2012- 2013 harvests.

1. Materials and methods

1.1. Fruit sample

Fresh olives were carried out during the 2012 -2013 crop season in different olive groves, Kallmet in Lezhe region, Kokerrmadhi I Elbasanit in Elbasan region, Kalinjot in Vlore region and Nisiot in Berat region. Representative samples from each one were picked in 10 kg boxes and taken directly to the laboratory where they were processed.

1.2. Oil extraction

The samples were processed using continuous extraction systems (Olerina 40, capacity 5-10kg). The unit consists in pulp centrifuge. Each sample was stored in dark bottles in room temperature, until analysis was performed.

1.3. Chemical analysis

Chemical analysis included the measurement of several parameters. Fatty acids, peroxide value, and UV Spectrophotometric indices (K232, K270). The quality indices of fatty acids, peroxide value, specific extinction coefficient of K232 and K270 and ΔK were calculated by absorption at $\lambda 232$ and $\lambda 270$ nm, respectively, by a UV spectrophotometer (Techcomp-7500 UV-Visible spectrophotometer) according to the European Commission Regulation EEC/2565/91 (Commission Regulation (EC), 1991). Insecticides I, VI (organ phosphorous) were determined according to UNI EN 1528-1/2/3/4:1997.

1.4. Pigment content

Chlorophyll and carotenoids were determined according to the calorimetry operating as described by *Minguez-Mosquera et al.* (1991). The maximum absorption at 670 nm is related to the chlorophyll fraction and that at 470 nm is related to carotenoid fraction. The values of the coefficients of specific extinction applied were $E_{0} = 613$ for pheophytin as a major

component in the chlorophyll fraction and $E_0 = 2,000$ for lutein as a major component in the carotenoids fraction. Thus the pigments content was calculated as follows: Chlorophyll (mg/kg) = $(A_{670} \times 106) / (613 \times 100 \times d)$ Carotenoid (mg/kg) = $(A_{470} \times 106) / (2,000 \times 100 \times d)$ where **A** is the absorbance and **d** is the spectrophotometer cell thickness (1 cm).

1.5. Total phenols

Total phenols were quantified according to the calorimetry in the polar fraction from 10 g of oil extracted three times using methanol/water (60:40 v/v), and the determination was based on the *Folin - Ciocalteu method* (Gutfinger, 1981). The extracts were measured at the absorption 725 nm and the values are given as mg of caffeic acid per kilogram of oil.

2. Results and discussions

Kalinjot is a traditional variety in Vlora region, one of the most outstanding cultivar for the production of olive oil in all Albania, with good resistance adaptable to different climates and soils. The oil is of excellent quality, with good organoleptic characteristics. The Kallmet cultivar is very resistant and its orientation is to produce olive oil. It is located in the north of Albania, adapted to resist to the low temperature of the region. Kokerrmadhi of Elbasan is a variety of Elbasan region and its purpose is to produce olive oil of excellent quality. Nisiot in Berat region produces good oil too.

Table 1 shows the data for the indicators of quality. They estimate the oxidation of oil: measurement of free fatty acids, the indication of primary oxidation and the oxidation that is connected to certain strange oxidized compounds, which are present in oil. The free acidity percentage is 0.19 to 0.6 for all samples, values that classified olive oil like extra virgin. Respectively the PV values are lower than legal limits for each olive oil produced in each region from the Kallmet, Kalinjot, Nisiot and Kokerrmadhi I Elbasanit cultivars. Changed in oxidative status as conjugate dienes (k_{232}), trienes (k_{270}), showed values lower than Standards.

The pigments, chlorophyll and carotenoids, both have an antioxidant role in report with the maturation of olive oil. Content for all samples are shown in **Table 2**. The highest levels were of chlorophyll pigment in relation to the carotenoids pigment.

The total phenols are very important for the quality of extra virgin olive oil, because of their involvement in its resistance to oxidation, bitterness and pungency of olive oil taste [7].

The data showed in **Table 2** demonstrate that "Kalinjoti" have the higher level of phenolic compounds. During the olive oil maturation, the level of total phenols decreases in time.

Table 1. Quality indexes of virgin olive oils extracted during 2010-2011 and 2011-2012

Quality indexes	Kallmet Lezhe	Kalinjot Vlore	Nisiot Berat	KME Elbasan	Extra Virgin Standards (limits)
Free acidity (% oleic acid)	0.6	0.4	0.19	0.56	≤ 0.8
Peroxide value (mev.O2/Kg oil)	17.5	5.1	12.4	18	≤ 20
K232	2.1	1.69	1.8	2.1	≤ 2.50
K270	0.19	0.16	0.18	0.2	≤ 0.20
ΔK	0.005	0.001	0.001	0.005	≤ 0.01

Table 2. Data about Chlorophyll, Carotenoids and Phenols content

	Kallmet Lezhe	Kalinjot Vlore	Nisiot Berat	KME Elbasan
Chlorophyll (mg/Kg)	3.43	4.69	1.2	4.37
Carotenoids (mg/Kg)	1.89	2.56	0.4	2.5
Total phenols (mg/l caffeic acid)	150	280	130	160

To complete the profile of olive oils, here by the **Sensory evaluation** (Panel must find medium of defect = 0 and medium of attribute > 0) to the quality indexes determination for each oil. The panel test is composed by 7 persons in Biotechnology Faculty. In **Figure 1** the intensity of the sensory defects detected in oils samples is shown. Oils were stored in open boxes and were produced directly. A reason why we didn't identify any defect. In **Figure 2** the positive attributes were shown. Moreover other attributes were observed in olive oils, artichoke was detected in lower value in Kallmet.

Figure 1. Negative sensory attributes for each cultivar purchased in each region.

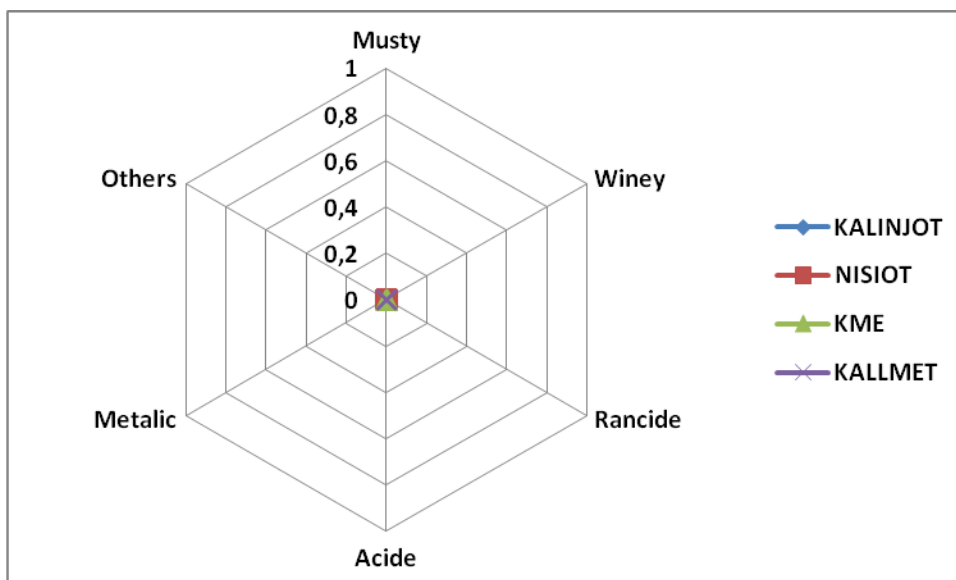
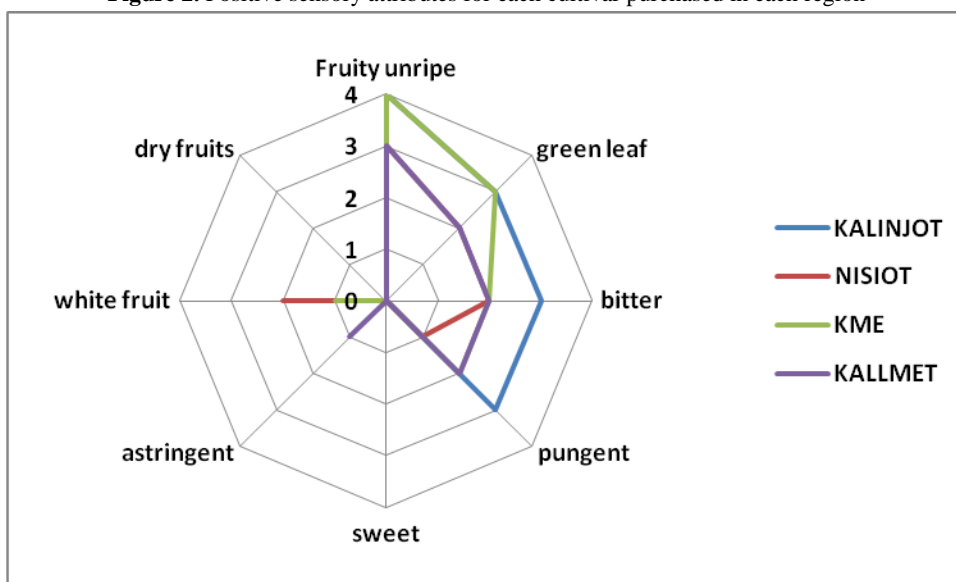


Figure 2. Positive sensory attributes for each cultivar purchased in each region



3. Conclusions

The olive varieties chosen for the present study are autochthonous for each region. Any cultivar exhibit very good quality, classified extra virgin olive oils, rich in antioxidant and in nutrition values. Kalinjot has the highest polar phenolic component in 280 mg/kg (acid caffeic). The olive oil sensorial profile showed intensities of the green almond and in Kalinjot olive oil we identified intensities of white fruits (apple) and the bitter attributes between 3 and 4. The sensorial profile showed more balanced oils. We can conclude that the profile of each variety can change according to the region, by the external factors, any olive

oil retains the characteristics of the cultivars. The phenol profile can be followed from the fruit to the oil production and through storage, and may serve as a good indicator of olive oil quality [8].

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