



Evaluation of Physicochemical Characteristic of Oleaster's (*elaegnus angustifolia*) Oil

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ABSTRACT

Elaeagnus angustifolia has wide range of distribution in the country and its oil has many food and health benefits. Its oil use for therapy of some disease included Dental diseases, diarrhea, stomach ulcers and prevention of bleeding. The purpose of this study was to investigate the physicochemical properties of the seed oil. Therefore *Elaeagnus* were collected of the surrounding gardens Semnan. Its core was separated. After drying, it was chopped by the mill, oil extraction was obtained by Soxhlet. Some traits were examined such as Peroxide value, acid and iodine value. 5% oil was obtained of *Elaeagnus Angustifolia*. The oil had high in linoleic acid and oleic acid its oil like sunflower oil and contains essential fatty acids omega-6 and omega-9 fatty acid. It also has good resistance to oxidation temperature. The mean iodine value was 120.73, oxidation stability 5:51 h, blue color 0.78 percent, red 2.79 percent, yellow 47.6%, peroxide 12.31 mill equivalents peroxide per kg of oil, non-soap compounds 5.17% , sterols 1283 mg/100gr oil, Tocopherol 94.3 mg/ 100gr oil, iron 0.62 ppm, copper 0.0366 ppm, Phospholipid 268.3 mg per gram, respectively.

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Introduction

The fruit of *Elaeagnus angustifolia* is used in Iranian traditional medicine as an analgesic agent for the alleviation of pain in rheumatoid arthritis patients. The *Elaeagnaceae* have a variety of medicinal uses (Ahmadiani et al., 2000). This species shows a broad geographical range, occurring widely in Asia and Europe, particularly in Turkey, Caucasia and Central Asia (Aksoy & Sahin, 1999). It is widely cultivated for its edible fruits in Middle and East Anatolia. The fruits are reddish-brown, elliptic, 9-12 mm long and 6-10 mm wide. The leaves are alternate, simple, linear or lanceolate, grayish green on the upside and silvery on the underside, covered with minute scales. The flowers are fragrant, insect-pollinated, campaniform, silvery on the underside, covered with minute scales (Kiseleva et al., 2011). Cansev et al. (2011) suggested that *Elaeagnus angustifolia* L. fruit was a valuable horticultural product thanks to its rich and beneficial nutrient composition. Their study was a preliminary research for investigating the nutritional values and potential use of *Elaeagnus angustifolia* L. species in the food industry. Goncharova et al. (1993) have also reported an abundance of palmitoleic acid (16:1) in fruit skin and linoleic acid (18:0) and palmitic acid (16:0) in seeds as both phospholipids and glycolipids. At this study, we evaluated physicochemical characteristic of Oleaster's Oil.

Material and Methods

5 kg of Oleaster was collected and Oleasters were washed with cold water, then the core was isolated. Oil mill cores were extracted for 5 hours by Soxhlet and according to AOAC 948/04 method. The amount and composition of fatty acids were measured by AOAC 963.22. Peroxide value was measured according to AOAC method No. 33/965 with three replications. Iodine index was obtained by gas chromatography according to AOCS the number Cd1C-85. The stability of oil against oxidation was determined according to AOCS Cd 12-57 for three gram sample at 110 ° C by Metroh rancimat model743.

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The color of the oil was obtained according to AOCS Cc 13e -92 methods by using Lavyband. Determination of phospholipid was performed based on by Cocks & Van method using spectrophotometry. Non-soap compounds were determined according to AOAC method No. 08/933, First oil was soap by alcoholic potash then the non-soap compounds were extracted by diethyl ether. Determination of sterols and tocopherols were performed according to AOAC method No. 51/970 by using thin layer chromatography.

Result and discussion

The percentage of oil extraction efficiency

Oil extraction experiments have been conducted in three replications. Oil contents were obtained 5.14, 5.21 and 6.64 % in three replications. Value of average was 5.66% (Table 2). List of fatty acids and their average values were showed at table 1, Amounts of saturated fatty acids and unsaturated fatty acids were obtained 7.69 and 83.08% respectively, according to this fact, *Elaeagnus Angustifolia* had unsaturated oil. Limited information is available in the literature regarding the fatty acid composition of *Elaeagnus angustifolia*. Goncharova et al. (1993) reported an abundance of palmitoleic acid (16:1) in fruit skin and linoleic acid (18:0) and palmitic acid (16:0) in seeds. These differences might be explained by differences in gentyes, climatic condition and soil composition.

The iodine index

The iodine index was obtained 120.78, 120.73 and 120.68 in three replications. Value of mean was 120 (Table 2) that, this value is more than Palm, sunflower, olive, soybean, and sesame seeds and almonds iodine index.

Oxidation stability

Oxidation stability was obtained 5 hours and 50 minute, 5 hours and 50 minute and 5 hours and 55 minute in three replications. Value of average was 5 hours and 51 minute (Table 2). Oil oxidation stability has inverse relationship with the percentage of non-saturation acids.

Table 1. List of fatty acids and their average values

C12:0	0.1	C18:2c	49.24
C14:0	0.12	C18:3	8.9
C16:0	4.38	C20:0	0.3
C16:1	0.1	C20:1	0.17
C17:0	0.12	C20:3n6	0.1
C17:1	0.06	C22:0	0.41
C18:0	2.01	C23:0	0.05
C18:1t	0	C24:0	0.2
C18:1c	33.36	other	0.33
C18:2t	0.05		

Table 2. The values obtained for each attribute

replication	percentage of oil extraction efficiency	The iodine index	Oxidation stability	Blue	red	Yellow	Peroxide value	Non-soap compounds	Sterols (mg/100g oil)	Tocopherol (mg/100g oil)	Iron ppm	Copper ppm	Phospholipids (mg/100g oil)
1	5.14	120.79	5:50	0.78	2.55	47	12.5	4.75	1250	99	0.65	0.03	260
2	5.21	120.74	5:50	0.77	2.88	49	12.5	5.45	1300	88	0.60	0.04	275
3	6.64	120.68	5:55	0.8	2.96	47	11.94	5.32	1300	96	0.63	0.04	270
Means	5.66	120.74	5:52	0.78	2.80	47.67	12.31	5.17	1283.33	94.33	0.63	0.04	268.33

According to this results that saturated acids are more than non-saturated acids so, *Elaeagnus Angustifolia* oil has low saturation and Oxidation stability.

Color

Blue color was obtained 0.78, 0.77 and 0.80 % in three replications also red and yellow colors were obtained 2.55, 2.88, 2.96, 47, 49 and 47 %, respectively (Table 2). The yellow color was more than red and blue; As a result, *Elaeagnus Angustifolia* oil has high Tocopherol. Carotenoids and lycopenes cause the red color. The blue color from red and yellow test is lower; this means that not many oil oxidation.

Peroxide value

Peroxide value represents the retaining of oil. Peroxide value was obtained 12.5, 12.5 and 11.94 equivalent per 1kg oil, in three replications (Table 2).

Non-soap compounds

Non-soap compounds were obtained 4.75, 5.45 and 5.32 % in three replications. Value of average was 5.17% (Table 2).

Sterols

Measuring of levels of phytosterols is one of the identifying characteristics of plant oils in order to determine the quality. Sterols contents were obtained 1250, 1300 and 1300 mg/100gr oil in three replications (Table 2). Value of average was 1283 mg/100gr oil.

Tocopherol

Tocopherols are widely used in various industries, food, pharmaceutical, health and animal feed. Tocopherol contents were obtained 99, 88 and 96 mg/100gr oil in three replications. Value of average was 94.3% (Table 2).

Fe, Cu

Stability and resistance of rancimat decreases with increasing of iron content, Fe contents were obtained 0.65, 0.6 and 0.63 ppm in three replications. Value of average was 0.62 ppm. Cu contents were obtained 0.03, 0.04 and 0.04 ppm in three replications (Table 2). Saha et al., (2015) revealed that the oleaster fruit is a good natural source of iron. Dolezal et al. (2001), reported lower (5.77 mg/kg) Fe content in oleaster fruit (unpeeled) suggesting that the oleaster fruits in Turkey contain greater amount of Fe.

Phospholipid

Phospholipid contents were obtained 260, 275 and 270 mg/100 gr of oil, in three replications. Value of average was 268.3 mg/100 gr of oil (Table 2). Oil and chemical characteristics are very important in order to identify the compounds. Free fatty acids and peroxide value are determined for the oil quality tests. Information and experiences gained in the field of identification of compounds and components of Oleaster's core oil and its properties, is an attempt to applications of this product in various fields of industrial. According to the results of this study, Oleaster seed oil has a high content of unsaturated fatty acids.

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