Study on *Portulaca Oleracea* Native Species as Vegetal Source of Omega-3 and Omega-6 Fatty Acids

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Fatty grass, grasita or purslane (Portulaca oleracea L.) is an important plant identified as a natural weed in field crops and lawns. Purslane is widespread worldwide and is popular as edible plants in many areas of Europe, Asia and the Mediterranean region. This plant possesses mucilaginous substances of great medicinal importance. It is a rich source of potassium, magnesium and calcium and has the potential to be used as a vegetal source of omega-3 and omega-6. It is very good as a source of alpha-linolenic acid (ALA) and gamma-linolenic acid (GLA) and contains the highest amount compared to any other green leafy vegetables. It also contains significant amounts of alpha-tocopherol and ascorbic acid, as well as an increased content of oxalate in fresh leaves. The antioxidant value and nutritional content of purslane are important for human consumption. It reveals a huge nutritional potential and indicates the potential for future use of this plant in food industry, dietary supplements, drugs, cosmetics and products for body care.

Keywords: Portulaca Oleracea, omega-3, omega-6

Purslane (*Portulaca oleracea L.*) deserves a special attention from farmers, nutritionists, doctors and other categories of researchers from the pharmaceutical industry, food supplements and cosmetics.Purslane is a common plant in areas of grass, lawn, and in field crops. Many varieties of purslane, which is known under several names, grow in a wide range of climates and regions. Purslane has a wide acceptability in Central Europe, Asia and the Mediterranean region. It is an important component as lettuce, and the fresh stem and young leaves are used raw, alone or in combination with other herbs. Purslane is also used for cooking or as pickes [1-3].

Its medicinal value is evident from its use in the treatment of burns, headaches, and also in diseases related to the gut, liver, stomach, cough, shortness of breath and arthritis, use as a purgative, cardiac tonic, emollient, muscle relaxant and anti-inflammatory treatment and diuretic, all of these making purslane important in herbal based medicine.Purslane was also used to treat osteoporosis and psoriasis. Recent research has demonstrated that the purslane has much better nutritional quality than the main vegetables, with a higher amount of beta-carotene, ascorbic acid and alpha-linolenic acid. In addition, purslane was described as a consistent food due to its high nutritive and antioxidant characteristics [4-8].

Different varieties, harvesting methods and environmental conditions can contribute to the composition and nutritional benefits of purslane. Purslane is popular in traditional Chinese medicine, to treat diabetes and arterial hypotension. From a scientific perspective, it was not proved to have anti-diabetic effect, but still people are using it for this purpose. An experiment was conducted to extract the raw polysaccharides in purslane to investigate the hypoglycaemic effects of these constituents with animal testing for the use of this plant in the treatment of diabetes [9-13].

Purslane is a good source of alpha-linolenic acid. Alpha-linolenic acid is an omega-3 fatty acid, which plays an important role in human growth and development and also in disease prevention. Purslane has been proved to contain a five times higher amount of Omega-3 andOmega-6 fatty acids, compared to the spinach. Fatty acids Omega-3 and Omega-6 belong to a group of polyunsaturated fatty acids that are essential for human growth, development, prevention of various cardiovascular diseases and maintaining of a healthy immune system.

The human body does not synthesize Omega-3 fatty acids. Therefore, the Omega-3 fatty acids must be consumed from an exogenous food source. Omega-3 fatty acids contain 18 to 24 carbon atoms and they have three or more double bonds in its chain of fatty acids. Omega-3 fatty acids are part of the family of polyunsaturated long chain fatty acids of carbon atoms and are represented by alpha-linoleic acid (ALA), eicosapentaenoic acid (EPA) and docohexanoic acid (DHA). Alpha-linolenic acid is considered essential as it can not be synthesized by the organism, the main source for obtaining it being the food. ALA may be converted in the body to EPA and DHA but the amounts are insignificant (less than 5%) [14-18].

Omega-6 is another class of polyunsaturated fatty acids comprising the linoleic acid (LA), gamma-linolenic acid (GLA) and arachidonic acid (ARA). LA is the main Omega-6 in the food, corn oil and and sunflower oil having the highest content; it is still considered an essential fatty acid because it cannot be synthesized in the body. Except for the human milk, most foods contain very little active GLA. ARA is found in meat and eggs. In the human body, Omega-6 fatty acids, especially the linoleic acid, are converted to

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arachidonic acid, which is embedded in the cell membranes [19-21].

There has been much debate among the nutritionists regarding the harmful effects of Omega-6 fatty acids, assuming that they would promote inflammation (because the arachidonic acid is involved in the early stages of inflammation) and thus would increase the cardiovascular risk. However, the linoleic acid generates anti-inflammatory molecules. Thus, at the level of the vascular endothelium, Omega-6 fatty acids have anti-inflammatory properties, suppressing the production of adhesion molecules, chemokines, and interleukins, which are the key mediators of the process of atherosclerosis [22-25].

Purslane has been identified as one of the richest vegetal sources of alpha-linolenic acid, an Omega-3 essential fatty acid. The lack of food sources of Omega-3fatty acids led to a growing interest to enter purslane as a new cultivated vegetable. Purslane flourishes in numerous biogeographical locations around the world and is highly adaptable to many adverse conditions, such as drought, saline solution and nutrient deficient conditions.

Purslane (*Portulaca oleracea*) is an annual plant of the Portulacaceae family, native to Southern Europe and Middle East. In Romania it is also known as grasita. It was mentioned by Dioscoride in the list of medicinal plants used by the Gauls, by the name of lax. It is a plant with root systems, with cylindrical and firm stem, fleshy, creeping, but it is also able to develop erect stems, often with a reddish shade, reaching lengths of 10-40cm. The leaves are thick, spatulate, narrowed to the base, glossy, dark green.The flowers are small, generally in yellow colored, but they can also be orange or reddish shaded. The fruit is a capsule with numerous gray colored small seeds. In a gram are contained about 2,400 seeds. A seed retains its germination properties for 3-4 years. The plant prefers light, sandy soils, rich in nutrients, located in warm areas of the world, and also in temperate or cold areas. It grows wild or cultivated in Europe, America and Asia.

The origin of purslane is uncertain, but the existence of this plant is reported as early as 4.000 years ago. Succulent stems and fleshy leaves of purslane demonstrates that it may have originated and can adapt to the desert climate of the Middle East and India. It can be found in Europe, Africa, North America, Australia and Asia. *Portulaca oleracea* is a cosmopolitan species and the portulaca genus belongs to the Portulacaceae family, which is a small family with 21 genus and 580 species, occurring especially in America and with some species identified in the Arab countries.

Purslane are succulent, an annual herbaceous plants, erectile or creeping, up to 30 cm height. Purslane is known under the botanical name *Portulaca oleracea* and is also called Portulaca. It grows well in orchards, vineyards, crop fields, landscaped areas, gardens, roadsides, and other spontaneous sites. The stems are cylindrical, up to 30 cm in length, 2-3 mm in diameter, green or red colored, developed in nodes, smooth, except for the underarms of the leaves, stems branched, and the distance between nodes is 1.5-3.5 cm in length [26-28].

The leaves are alternately or superimposed, flat, fleshy, having variable shapes, obovate, with a length of 1-5 cm, obtuse or slightly notched at the tip, tapered at the base, smooth and coated on the upper surface, with full edges.The leaves are in the form of a spatula, succulent, with very short stems, about 5-30 mm in length, and they are green or green with red border.The blooming period is initiated in May and extends until September. Flowers are single or clusters of two to five to the top. The flowers are small, with colors of orange, pink, yellow, purple or white, with five petals and they are usually opened only in warm and sunny days from mid-morning to early afternoon.Fruits are formed by egg-shaped capsules, almost rounded, approximately 4-8 mm in length and they open in the middle to release the seeds. The seeds are small, less than 1 mm in diameter, flattened, brown to black, with a white point of attachment. Many seeds are produced.

The health benefits of purslane are due to its nutritional value and content in unsaturated fatty acids. It is rich in vitamin A, which is a natural antioxidant asset. The presence of this vitamin may play an important role in the health of the mucous membranes, for the protection against lung cancer and mouth cavity. Purslane has one of the highest content of vitamin A among the vegetables with green leaves. It also contains vitamin C and B vitamins such as riboflavin, niacin, and pyridoxine. This provides large amounts of food minerals such as potassium, magnesium, calcium, phosphorus and iron.Omega-3 fatty acids: purslane is one of the richest sources of green plants in Omega-3. Its consumption determines lower values of cholesterol and triglycerides, and also the increase of beneficial high-density lipoproteins.Moreover, the ability to provide Omega-3 fatty acids leads to reduced atheroma and may be advantageous in the treatment of vascular diseases. Omega-3 fatty acids are important nutrients for the body, in particular for the maintenance of cardiovascular health. Often recommended for their anti-inflammatory and anticoagulant properties, Omega-3 healthy fats reduce considerably the onset risk of heart disease or heart attack triggering.

Most people associate the benefits of Omega-3 fatty acids with a healthy heart, but they have many key roles in the body. For example, they are important for brain function, improved mood, memory, joint mobility, reduce inflammation caused by arthritis, protection of vision health, strengthen the immune system and maintain hair, skin and nails in optimal shape.

The most important fatty acids in the nutritional point of view,in the category of Omega-3 essential fats are the alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Alpha-linolenic acid is among the fatty acids classified as essential, because it can not be produced by the body and plays a basic role in many physiological functions.The body converts the alpha-linolenic acid to two important Omega-3 fats, namely the eicosapentaenoic acid and docosahexaenoic acid. These two derivatives acids can also be derived from certain foods, such as the species of cold water fish (salmon, tuna, halibut or herring). The eicosapentaenoic acid plays an important role in preventing the cardiovascular disease, while the docosahexaenoic acid is required for proper development of the brain and nervous system.Unlike fish oils with high cholesterol and caloric content, purslane also provide an excellent source of beneficial Omega-3 fatty acids, cholesterol-free as those in fish oils.

The role of Omega-3 fatty acids in the body

Each cell of the body is surrounded by a cell membrane, primarily composed of fatty acids. It regulates the necessary level of nutrients that get inside the cell and facilitates the elimination of residual products. To fulfill its functions optimally, the cell membrane must maintain its integrity and fluidity (diseased membrane cells lose their ability to retain water and vital nutrients, and to promptly communicate with other cells). Since the structure of cell membrane is composed mostly of fats, the Omega-3 fatty acids are directly involved in the longevity of the body's cells.

Another important function of Omega-3 essential fats is to actively participate in the production of powerful substances, like hormones, called prostaglandins. The latter regulates many physiological functions, from blood pressure and blood clotting, to the information transmitted to the nerves, inflammatory and allergic responses, functioning of the renal system and the gastrointestinal tract and the production of other hormones. For instance, the eicosapentaenoic acid and the docosahexaenoic acid are direct precursors of prostaglandins of the 3 series, considered to be beneficial because it reduces platelet aggregation andinflammation, while improving the blood circulation. The role of the EPA and DHA acids in the prevention of cardiovascular disease can be explained in part by the ability of these fatty acids to increase the production of beneficial prostaglandins.

Researchers have recently discovered an fatty organic product, derived from EPA (following the intervention of cellular enzymes), called Resolvin, that inhibits the proliferation and migration of inflammatory cells and of harmful chemical products in close proximity to the inflamed regions. Unlike the anti-inflammatory drugs, such as aspirin or ibuprofen, the Resolvin within the body, derived from EPA acids, show no side effects on the gastrointestinal or cardiovascular system.

Symptoms of deficiency in Omega-3 fatty acids

Recent medical statistics show that over 90% of the population does not have a sufficient intake of essential Omega-3 fatty acids in their daily diet. Symptoms of deficiency in these nutrients are often confused with the clinical manifestations of other nutritional deficiencies or disorders. Signs and symptoms that the body sends if it does not take enough Omega-3 are: low physical strength, lack of concentration, tiredness, aches and pains.

There are three varieties of purslane, namely: green, gold, and a variety with reddish leaves. In table 1 are listed the important sources of Omega-3 fatty acids; the presence of these acids cause a low incidence of cancer and heart disease, eventually, in part because of the natural intake of Omega-3 fatty in the products with the purslane.

Table 1

VEGETAL SOURCES OF OMEGA-3 FATTY ACIDS (g/ 100 g)

Category	Fruits/vegetables	Amount (g)
Low	Avocados, California raw	0.1
	Broccoli	0.1
	Strawberries	0.1
	Cauliflower, raw	0,1
	Kale, raw	0.2
	Spinach, raw	0.1
	Peas, garden dry	0.2
	Cowpeas, dry	0.3
	Beans, navy, sprouted, cooked	0.3
	Corn, germ	0.3
Medium	Bean, common dry	0.6
	Leeks, freeze-dried, raw	0.7
	Wheat, germ	0,7
	Spirulina, dried	0.8
	Purslane	0.9
	Oat, germ	1.4
	Beachnuts	1.7
	Soybeans kernels, roasted	1.5
	Soybeans, green	3.2
High	Soybean oil	6.8
	Walnuts, Persian, English	6.8
	Wheat germ oil	6,8
	Butternuts	8.7
	Walnut oil	10.4
	Rapeseed oil	11.1

Purslane is the best used green vegetable for human consumption as a rich source of minerals and Omega-3 fatty acids. Compared to the leaves of spinach, purslane leaves contain a high content of alpha-linolenic acid (18: 3 ω3), alpha-tocopherol, ascorbic acid and glutathione.

Purslane has one of the highest levels of alpha-linolenic acid, which is an essential Omega-3 fatty acid for human nutrition as compared to any other green leafy vegetables. The leaves of purslane grown in the chamber of controlled and in the wild presented a greater amount of alpha-linolenic fatty acid (18: 3 ω3) than the spinach leaves. The highest amount (3.41 mg / g) of alpha-linolenic acid was recorded in the growth chamber where the purslane and was cultivated, it was seven times higher than that in the leaves of spinach (0.48 mg / g).

Edacious use

-Purslane has no flavor; fleshy leaves have a refreshing taste, slightly spicy and astringent (a little citric) and their texture is both crispy and succulent.

-The leaves and young stems are a nice addition to salads. In Middle East there are prepared delicious salads of chopped purslane leafs, yogurt and various green vegetables (green cucumber, green pepper, etc.) as an accompaniment to roasted meat. Purslane is one of the famous ingredients in Lebanese salad Fattoush.

-Mature leaves are blanched and used as a vegetable. Cooking enhances their mucilaginous content, making them a good thickener for soups and stews. In Turkey, for example, the purslane is used to prepare stews of lamb and beans, while around the entire Mediterranean is used in soups. In Mexico, the purslane is cooked with pork, tomatoes and peppers (especially those of the chipotles variety). The purslane is also very suitable combined with spinach, olive oil and lemon juice. It is a high quality companion for the dishes prepared with beets, beans, cucumbers, eggs, cheese, potatoes, yogurt.

-Among other spices, it fits well with borage, chervil, cress (nasturtium), cow-cheese, cress, ruccola, watercress, parsley, mint, etc. (http://condimenteweb.ro).

Fig.1 *Portulaca oleracea* [a, b, c, d]

Experimental part

Materials and methods

In order to obtain the dried vegetal product of purslane (*Portulaca oleraceea*), after harvesting, the fresh vegetal product passes through the following stages (within SC Hofigal Export Import SA):

-*sorting of the fresh vegetal product*: is performed for removing foreign matter (parts of the same plant or parts of other plants and foreign materials of mineral origin).

-*washing of the vegetal product*: is performed using the XY-700 vegetable material washing machine with drum made of stainless steel for removing any foreign mineral origin (dust, sand).

- d*rying of the vegetal product*: after washing, the fresh vegetal product is introduced in the HG 25 hot air dryer which has been previously brought to a temperature of 400°C. Drying is carried out over a period of 48 h. After the drying process, hot air supply of the dryer is closed and the dried vegetal product is discharged.

The HG 25 dryer is provided with panel, electro-mechanical system in the feeding area, gear system, conveyor belt made of stainless steel, drying room, radiator, fan. The operating parameters of the HG 25 dryer equipment are: voltage 380 V;hot air pressure: 1.5-3 bar; temperature: 400°C; time: 48h.

-*grinding of the driedthe vegetal product*: is performed using the MMC 2 mill for grinding plant material, which is made of stainless steel, provided with sliding elements on the side walls to remove the shaft port knife, lugs of the lid in the upper part of the mill, parts for catching the discharge bag at the bottom, sieve holder located inside the sidewalls, main shaft with 16 double-edged knives, arranged by 4 to 900. Grinding of the dried plant product takes place as follows:

-the collection box for the chopped plant material is fixed at the outlet of the mill;

-sieve no. 8000 m is being assembled;

-the mill for grinding the vegetal material is started acting the switch;

-the dried vegetable product is introduced in the MMC 2 mill feed funnel, gradually or in portions, so that a sudden supply of the mill does not lead to its blocking.

In order to determine the chromatographic profile of fatty oil in *Portulaca oleracea* it was used the chromatographic method (GC-MS) for the identification and dosing of fatty acid composition: it is performed according to the method of analysis developed by the European Pharmacopoeia, the currentedition.

Equipment:

-gas chromatograph coupled with mass spectrofotometer;

-refluxing installation.

Reagents:

-petroleum ether R;

-the sample to be analyzed: the oil as such;

-hydrochloric acid R in methanol, 0.5 M solution;

-water R;

-isooctane R;

-heptane R;

-sodium sulfate R, anhydrous;

- *test solution:* 0.1 g of sample is weighted into a round bottom flask and is dissolved in 5.0 mL of ether petroleum R and 50 mL of ahydrochloric acid R in 0.5 M methanol solution. It is then maintained at reflux under stirring and heating in the nest, at a temperature of about 65°C for 1h (until there is no further notice of unmethylated drops of oil). The sample is cooled and passed into a separating funnel. The round-bottomed flask is washed with 30-40 mL of water R, then with 40 mL of isooctane R and is added and the separatory funnel. The isooctane layer is washed with water R to neutral *p*H. The iso-octane layer is separated, and switched over to anhydrous sodium sulfate R, to remove water and then is filtered;

- *reference solution A:* a calibration mixture is prepared with the composition described in the European Pharmacopoeia, the current edition, Chapter 2.4.22. Table 2.4.22.-1, the substances being dissolved in heptane R, thus:

Table 2

Substances in the mixture	Amount (%, m/m)
Methyl laureate R	5
Methylmyristate R	5
Methyl palmitate R	10
Methyl stearate R	20
Methylarachidic R	40
Methyl oleate R	20

Chromatographic system:

a)Gas chromatograph fitted with:

- detector MS (mass spectrometer);
- split injector;
- automatic injection system of the sample for analysis;
- automatic integration system of peak areas of the obtained chromatograms.

b) column:

- material: fused silica; lenght 30 m, diameter 0.25 mm;
- macrogol stationary phase 20000 R (film thickness 0.25µm);

c) work conditions:

-carrier gas: helium R, for chromatography;

-flow: 1.5 mL/min;

-split report: 1:60;

-temperature program:

Table 3

Characteristic	Time (minutes)	Temperature (°C)
Column	0 - 5 6.0 – 10.0 10.0	160 160 - 200 200 - 225
Injector	-	250
Detector	-	270

Technical work

1µL of reference solution A and 1 µL of test solution are injected. Retention times are recorded. Resolution: minimum 1.8 between the peaks determined by methyl oleate and methyl stearate in the chromatogram obtained with the reference solution A.

Identification: oil components in the sample are located by using MS spectra library in the range M/Z: 40-450. The limits range as follows: oleic acid (40 - 55%), linoleic acid, (26- 36%), α-linolenic acid <0.5%, palmitic acid (10 -20 %), stearic acid (4 - 8 %).

Results and discussions

1. Chromatographic profile of fatty oil in *Portulaca oleracea,* plant harvested in *September 2014*

Qualitative Report Library Gas-Chromatograph GC – MS

Data File: Purslane oil /from 05.09.14
Current Data Path: C:\Xcalibur\DATA2\Fat oil 9\\
Sample Type: Unknown
Acquisition Date: 9/5/2014 10:05:39AM
Run Time (min): 73.57
Vial: 171
Injection Volume (µL):1.00
Calibration Level:
Instrument Method: C:\Xcalibur\DATA2\Fat oil 9\1mlOMEGA315200oFB.meth
Processing Method: C:\Xcalibur\DATA2\ Fat oil 9\22SoftNou 10pkBB V

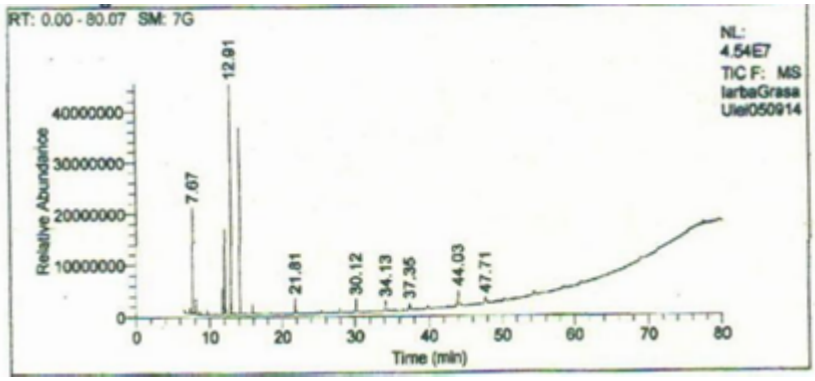

Fig.2. Chromatogram: Purslane oil

No.	Compound name	RT	Area %	Peak area	Peak height	S/N
1.	Palmitic C16:0	7.67	12.35	71117379	18642779	10965.15
2.	Stearic C18:0	11.74	3.47	19994144	4696064	2762.09
3.	Oleic C18:1	12.04	10.73	61772557	15426807	9073.61
4.	Linoleic γ C18:2	12.91	28.72	165386823	40947710	24084.27
5.	Linolenic α C18:3	14.16	22.95	132159759	32888611	19344.14
6.	Behenic C22:0	21.81	3.98	22898744	2941177	1729.92
7.	Lignoceric C24:0	30.12	4.23	24352107	2532264	1489.41
8.	Octaethylene glycol	34.13	3.88	22315831	1887804	1110/35
9.	Octaethylene glycol	37.35	2.78	15983424	1273614	749.10
10.	Octaethylene glycol	44.03	6.91	39796113	2927671	1721.97

Table 4

Chromatographic profile of fatty oil in *Portulaca oleracea* , plant harvested in *September 2014* shows a content in fatty acids in the following decreasing order of its abundance, as follows:

Linoleic γ C18:2> Linolenic α C18:3> Palmitic C16:0> Oleic C18:1> Octaethylene glycol> Lignoceric C24:0> Behenic C22:0> Stearic C18:0.

Chromatographic profile of fatty oil in Portulaca oleracea, plant harvested in July 2015

Qualitative Report Library Gas-Chromatograph GC – MS

Data File: PURSLANE OIL AROMA
Current Data Path: C:\Xcalibur\DATA2\Fat oil 11\\
Sample Type: Unknown
Acquisition Date: 7/10/1015 1:15:52 PM
Run Time (min): 64.21
Vial: 184
Injection Volume (µL):1.00
Calibration Level:
Instrument Method: C:\Xcalibur\DATA2\Fat oil11\1mlOMEGA315200oFB.meth
Processing Method: C:\Xcalibur\DATA2\Fat oil 10\22NewSoft10pkBB V

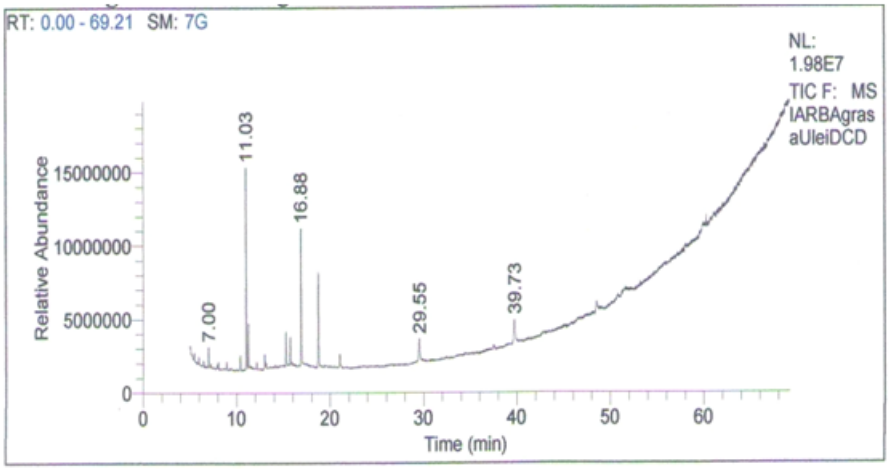

Fig.3. Chromatogram: Purslane oil DCD

No.	Compound name	RT	Area %	Peak Area	Peak Height	S/N
1.	Palmitic C16:0	11.03	22.79	44389992	12264614	4826.22
2.	Octaethylene glycol	11.26	5.60	10904771	2836824	1116.31
3.	Stearic C18:0	15.29	4.62	9006212	2160348	850.11
4.	Oleic C18:1	15.74	4.41	8597755	1815668	714.48
5.	Linoleic γ C18:2	16.88	21.41	41702183	8704515	3425.29
6.	Linolenic α C18:3	18.74	17.14	33391578	6169749	2427.84
7.	Arachic C20.0	21.05	3.35	6528791	914518	359.87
8.	Behenic C20:0	29.55	7.52	14646225	1524510	599.91
9.	Lignoceric C20:0	39.73	9.13	17787096	1544868	607.92
10.	Octaethylene glycol	48.57	4.03	7854646	723303	284.63

Table 5

Chromatographic profile of fatty oil in *Portulaca oleracea* , plant harvested in July 2015 showsa content in fatty acids in the following decreasing order of its abundance, as follows:

Palmitic C16:0> Linoleic γ C18:2> Linolenic α C18:3> Lignoceric C24:0> Behenic C22:0> Stearic C18:0> Oleic C18:1> Octaethylene glycol> Arachic C20.0.

Chromatographic profile of fatty oil in Portulaca oleracea, plant harvested in August 2016 Hofigal/ Alexandria

Qualitative Report Library Gas-Chromatograph GC – MS

Data File: Purslane oil Furculesti DCD from 01.07.16

Current Data Path: C:\XCALIBUR\DATA2\FAT OIL 14\

Sample Type: Unknown

Acquisition Date: 8/18/2016 12:49:05 PM

Run Time (min): 56.08

Vial: 173

Injection Volume (µL):1.00

Calibration Level:

Instrument Method: C:\Xcalibur\DATA2\Fat oil 12\1ml OMEGA315250oFarm.meth

Processing Method: C:\Xcalibur\DATA2\Fat oil 12\22 SoftNou 10pkBB V

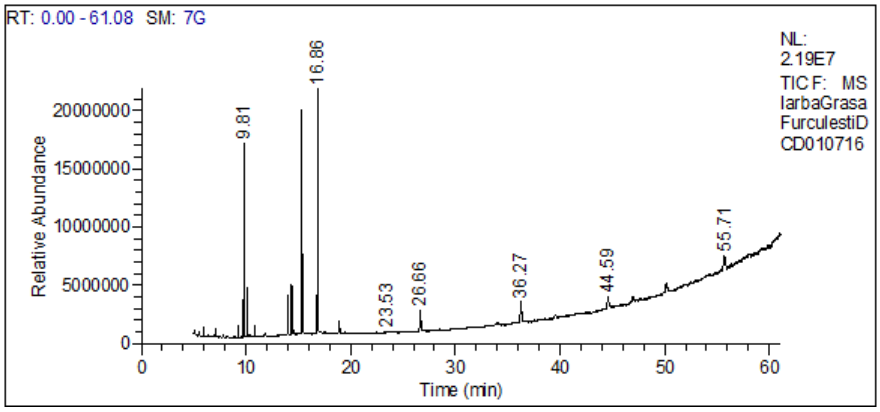

Fig. 4. Chromatogram: Purslane Hofigal/ Alexandria, Furculesti DCD

No.	Compound name	RT	Area %	Peak Area	Peak Height	S/N
1.	Palmitic C16:0	9.81	17.08	50689257	14794604	9109.20
2.	Stearic C18:0	13.99	3.70	10975258	3027276	1863.93
3.	Oleic C18:1	14.38	4.52	13416004	3779391	2327.01
4.	Linoleic γ C18:2	15.34	21.88	64929669	17421797	10726.79
5.	Linolenic α C18:3	16.86	27.94	82941020	19463104	11983.65
6.	Behenic C20:0	26.66	5.04	14961490	1783426	1098.08
7.	Lignoceric C24:0	36.28	5.46	16205158	1741672	1072.37
8.	Tricosanol	44.60	3.80	11286730	990496	609.86
9.	Hexacosanol	55.70	5.79	17186301	1287768	792.89

Table 6

Chromatographic profile of *Portulaca oleracea* fatty oil, plant harvested in August 2016 *Hofigal / Alexandria* shows a content in fatty acids in the following decreasing order of its abundance, as follows:

Linolenic α C18:3> Linoleic γ C18:2> Palmitic C16:0> Hexacosanol> Lignoceric C24:0> Behenic C22:0> Oleic C18:1> Tricosanol> Stearic C18:0

Chromatographic profile of fatty oil inPortulaca oleracea, plant harvested in August 2016 Hofigal/ Bucharest

Qualitative Report Library Gas-Chromatograph GC – MS

Data File: Purslane oil CPCasa 10.08.2016

Current Data Path: C:\XCALIBUR\DATA2\FAT OIL 14\

Sample Type: Unknown

Acquisition Date: 8/22/2016 10:27:38 AM

Run Time (min): 58.33

Vial: 191

Injection Volume (µL):1.00

Calibration Level:

Instrument Method: C:\Xcalibur\DATA2\Fat oil 12\1mlOMEGA315250oFarm.meth

Processing Method: C:\Xcalibur\DATA2\Fat oil 12\22SoftNou 10pkBB V

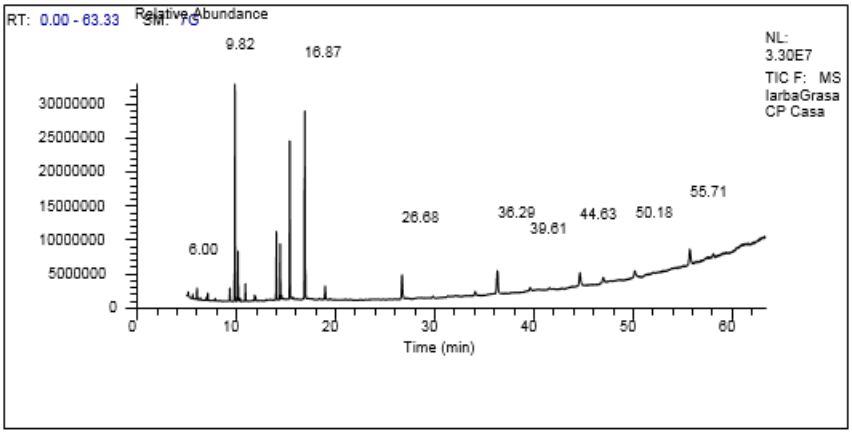

Fig.5. Chromatogram: Purslane oil Hofigal/ Bucharest

No.	Compound name	RT	Area %	Peak Area	Peak Height	S/N
1.	Palmitic C16:0	9.82	24.40	97738693	284012214	14915.65
2.	Stearic C18:0	14.00	6.65	31867798	8999900	4726.54
3.	Oleic C18:1	14.39	5.39	25818405	7305332	3836.59
4.	Linoleic γ C18:2	15.35	16.80	80495948	21274313	11172.77
5.	Linolenic α C18:3	16.87	23.46	112430448	26081383	13697.33
6.	Behenic C20:0	26.68	5.61	26873701	3478003	1826.57
7.	Lignoceric C24:0	36.30	6.78	32505233	3338196	1753.14
8.	Tricosanol	44.62	4.57	21874399	1940109	1018.90
9.	Hexacosanol	55.71	5.33	25516492	21984494	1154.60

Table7

Chromatographic profile of *Portulaca oleracea* fatty oil, plant harvested in August 2016 *Hofigal / Bucharest* shows a content in fatty acids in the following decreasing order of its abundance, as follows:

Palmitic C16:0> Linolenic α C18:3> Linoleic γ C18:2> Lignoceric C24:0> Stearic C18:0> Behenic C22:0> Oleic C18:1> Hexacosanol> Tricosanol.

Fig. 6. *Portulaca oleracea*

Table 8

COMPARATIVE STUDY OF THE CHROMATOGRAPHIC PROFILE OF THE PLANT HARVESTED IN THREE CONSECUTIVE YEARS IN THE SAME AREA, IN JULY, AUGUST, SEPTEMBER

No.	Component name of the fatty oil	Content in the plant from 09.2014	Content in the plant from 07.1015	Content in the plant Hofigal Alexandria from 08.2016	Content in the plant Hofigal Bucharest from 08.2016
1	Palmitic C16:0	12.35	22.79	17.08	24.40
2	Octaethylene glycol α	3.88	5.60	-	-
3	Stearic C18:0	3.47	4.62	3.70	6.65
4	Oleic C18:1	10.73	4.41	4.52	5.39
5	Linoleic γ C18:2	28.72	21.41	21.88	16.80
6	Linolenic α C18:3	22.95	17.14	27.94	23.46
7	Arachic C20:0	-	3.35		
8	Behenic C20:0	3.98	7.52	5.04	5.61
9	Lignoceric C20:0	4.23	9.13	5.46	6.78
10	Octaethylene glycol β	2.78	4.03	-	-
11	Octaethylene glycol γ	6.91	-	-	-
12	Tricosanol	-	-	3.80	4.57
13	Haxacosanol	-	-	5.79	5.33

From table 8 it results that:

-the content in Omega-3 (Linolenic α C18:3) was the highest in the vegetal product harvested in August, respectively in September;

-the content in Omega-6 (Linoleic γ C18:2)was the highest in the vegetal product harvested in September, respectively in August;

-the lowest content in Omega- 3 (Linolenic α C18:3) was found in the vegetal product harvested in July;

-For the purpose in this study, the optimum time of harvesting the native plant *Portulaca oleracea* as natural plant source of Omega-3 / Omega-6 is August-September.

Conclusions

It was found the possibility of dosing fatty oil in the dry plant (2.20- 2.24%), while in the

fresh plant the oil is in traces.

The presence of fatty acids Omega 3, 6 and 9 in the composition of analyzed *Portulaca* samples [essential fatty acids Omega-3 (Linolenic C18: 3); Omega-6 (Linoleic C18: 2) and Omega-9 (Oleic C18: 1)] meet the above functions and its manifest these actions when the plant is an active source of raw material source for drugs, food supplements and cosmetics.The presence of this plant on almost all types of relief in our country, where it grows without large claims, is a source of native raw material to a very low cost, which contributes to improving the production costs, according to key concepts in business, efficiency by efficiency.

As a significant source of Omega-3 oils, *Portulaca oleracea* could bring considerable health benefits for vegetarian diets and other areas where the consumption of fish oils is excluded. Scientific analysis of its chemical components showed that this common plant has a less frequently encountered nutritional value, making it one of the most important potential food for future.

Also, the presence of a high content of antioxidants (vitamins A and C, alpha-tocopherol, beta carotene and glutathione), fatty acids Omega-3, 6 and 9, due to its healing effects wound and antimicrobial properties, and its traditional use in the local treatment of the inflammatory conditions suggests that the purslane (*Portulaca oleracea*) is a very likely candidate and also as a useful cosmetic ingredient.

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