

VEGETABLE OILS LESS USED IN FOOD TECHNOLOGY

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The raw materials used at world level to obtain vegetal oils are very diverse coming from very different species growing on various meridians and producing oils with unique characteristics. A part of these oils are well known but there are oils practically unknown for consumption for different reasons (technological problems or related to the accessibility of the raw materials). Many of these oils less known deserve attention due to their very obvious dietary or medicinal qualities They are very valuable, due to the essential fat acids, vitamins, antioxidants and other bioactive compounds they contain. The hypo cholesterol value of the essential fat acids is tightly related to the global quality of lipids from diet, the total caloric share as well as the size of the ratio between the essential polyunsaturated fat acids and the saturated fat acids (P/S) that must be supra-unitary with a value over 2. To insure this ratio it is necessary that at least 1/3 from the total quantity of lipids consumed should come from oils rich in polyunsaturated fat acids: sun flower oil, nut oil, soy oil or corn germ oil. From the process of obtaining and processing the vegetal oils there result edible oils even very valuable but also non-alimentary, harmful oils, such as: castor oil, tung oil, hemp oil. The last ones are used as technical oils with varied uses in many industries The technical oils, such as linseed oil, rape oil, castor oil, hemp oil, tung oil have different uses to produce glycerin, soaps, or they are raw material to produce siccative oils, paints and lacquers.

Keywords: *vegetal oils, essential fat oils, dietary value, pharmaco-dynamic activity.*

Vegetal oils can be found in the nature in the plant tissues being concentrated in seeds, pulp and the fruit stone, in tubercles or germs.

Oils less used in alimentation for different reasons (technological problems or related to the accessibility of the raw materials) come from plants such as: nut tree, pumpkin, grapes, cereals, peanuts, castor oil plant, cotton, linen, almond.

MATERIAL AND METHODS

We used a vast bibliographic material so as to evaluate the alimentary and dietary importance of oils.

We insisted on some characteristic aspects related to type and value of some assortments sometimes less known and highlighted.

RESULTS AND DISCUSSION

The raw materials poorer in oil such as the grapes seeds, the tomato seeds, the pumpkin seeds, and germs are not submitted to the pressing operation but are only ground and flattened for extraction with solvents.

Table 1

Oil contents of vegetal materials

Name of product	Oil contents%
Coconut	50-60
Sesame	51/53%
Pecan nuts	72,1
Hazelnut tree	62,4
Peanuts	37-50
Pumpkin seeds	45-48
Pistachio	44,6
Nuts	48
Linen	40
Tobacco seeds	35-40
Sorghum seeds	30-40
Corn germs	20-57
Hemp seeds	28-34
Cotton seeds	17-23
Tomato seeds	25-26
Rice germs	24-25
Grapes seeds	10-18
Wheat germs	10-17
Rye seeds	11-13

Coconut (*Cocos nucifera*). The unrefined coconut oils (Virgin Coconut Oil), that can be found on the market labeled as „Virgin”, are extracted from fresh coconuts by two methods: 1) rapid drying – the fruit pulp is dried, pressed and then they extract the oil; 2) humid grinding – the oil is extracted from the fresh pulp, without a preliminary drying, together with the coconut “milk”. Subsequently, the oil is separated from water through the following operations: boiling, fermentation, refrigeration, and centrifugation.

The refined oil is obtained starting from the dry core of the coconut – *copra*. This may be obtained by drying in ovens or by drying in the sun. The coconut oil has a large validity term as compared to other oils, up to two years, due to the high contents of saturated fat acids. It is kept best in solid form at temperatures under 24°C. It is used in skin disorders, hair care or cosmetics.

Nut tree (*Juglans regia*) In old times, the only vegetal oils produced in the Romanian Principalities were the hemp and linseed oil and they imported olive oil for consumption by the rich.

In the Monograph of county Putna, written by Ion Ionescu de la Brad in 1869 he says: „In vineyards the production of nuts is prodigious. The dry nuts and

prunes mean a considerable income especially for the peasants that deal with the production of plum brandy and obtaining butter from nuts. The most used butter for consumption is the one obtained from the hemp seeds.”

Having between 73-84% polyunsaturated fat acids, the nut oil situates on the first place among the unsaturated oils before the soy oil (50-60%) and the corn oil (40-50%), for their anti-cholesterol properties. It contains linoleic acid, linolenic acid, oleic acid and very little saturated fat acids (palmitic and stearic). The nut oil obtained by cold pressing has a light yellow color, a strong characteristic taste and smell. It is a healthy oil but quite demanding in terms of storage since it gets rancid very quickly. It may be kept for a short time in cool and dark places.

The nut oil is indicated for the protection of the cardiovascular system. It is also used in dermatosis, nephrolithiasis, milk legs, and burns.

Corn germs (*Zea mays*) By degermination there result germs with a quantity of corn groats (10-12% from the grains) and the oil contents of germs varies between 20-30%. The corn germs serve to produce a valuable oleaginous raw material (high contents of tocopherol in the corn germ oil) and to obtain some defatted products from corn.

Wheat, rye and rice germs They are obtained industrially by separating them from the grinding seeds. Germs depreciate in a relatively short time due to the fermentative hydrolysis and rapid oxidization of the oil contained. In case of immediate processing after separation, the oil resulted has good edible qualities being much appreciated as dietary oil due to its high contents of linoleic acid.

Pumpkin (*Cucurbita pepo*) The oil extracted from the pumpkin seeds (45-48%) is an excellent regulator of the nervous and hormonal activity; it is one of the strongest vermifuge and natural detoxifier being used in the past in numerous diseases from the infectious ones to the ones with a hormonal or nervous substratum. It is produced by the cold pressing technology; it is rich in carotene and vitamins A, E, F, K. Its consumption in crude state helps eliminating the intestinal parasites, treating the prostatic hypertrophy, regulating the cardiac and circulatory disorders, regulating the intestinal tract, diminishing the nasal bleedings by fortifying the blood vessels, compensating the vitaminic deficiencies.

Grapes seeds oil (*Vitis vinifera*) is resistant to high temperatures (224°C) and thermal degradation. It has a light yellow color and a delicate taste. It is a rich source of antioxidants (vit. E) and essential fat acids. Among the essential fat acids absolutely necessary for the human body, the linolenic acid was identified in high quantities in the grapes seeds oil that has positive effects over the cardiovascular, circulatory and immunity system.

The anthocians identified in this oil prevent the deterioration of the blood vessels. Among the poly-phenols identified we mention resveratrol which has a strong anti-cancerous action. The researches effectuated demonstrated the positive effect of this oil on teeth. It seems that it might inhibit the development of bacteria in the oral cavity, bacteria that play an important role in creating dental decay.

Linen (*Linum usitatissimum*) is cultivated in our country on large surfaces in the steppe and silvo-steppe areas. The oil is obtained from the linen seeds by cold

pressing and mechanical purification. It contains fat acids omega 3 and its usage in alimentation is benefic because it eliminates gallstones and renal calculi and regulates the intestinal tract. It also helps curing burns.

Due to its siccative qualities and the ones for fixing the pigments of different colors, the linen oil is used from ancient times to prepare paints.

Peanuts (*Arachis hypogea*). Oil is obtained from the decorticated peanuts separated by the core skin, by two or three cold pressings; the third one is made to a high temperature of about 70°C. The oil obtained by cold pressing is colorless or very weakly colored in yellow, with a taste and smell similar to the olive oil and is used in alimentation. This unrefined oil, obtained by cold pressing falls into two qualities: first quality with an acidity index of maximum 1 and second quality with an acidity index of maximum 1,5.

Sesame (*Sesamum indicum*) is a plant originating in Africa and India.

The sesame oil is used in alimentation especially in South Asia where it has a dark color and a strong flavor due to the seeds fried in their skin. The oil does not have the same pleasant flavor if the seeds are not fried before pressing.

The oil obtained by cold pressing is almost colorless, the Indian one has a golden color and the Chinese one has a dark color. Seeds are rich in tocopherols and phytosterols, vitamin B1, Ca, Mn. The oil obtained by hot pressing has a dark color and an unpleasant taste that is why it cannot be used in alimentation unless it has been refined. The refined oil has anti-oxidative properties.

It is rich in antioxidants such as vitamin E, and minerals: Mn, Cu, Ca, Fe. Internally it is used as laxative, in dental pains, headaches. The high contents of polyunsaturated fat acids help regulating the blood pressure.

In pharmacy, the sesame oil is used to obtain some medicines like Iodinol and Brominol. This oil is also used in dentistry for gums disorders due to its bactericide effect (sesamin and sesamol).

Almond (*Prunus amygdalus*) The oil is extracted from the almond stone, it has a specific smell and tastes like nut. It is little soluble in alcohol but it is very soluble in chloroform or ether. It may be used as a substitute for the olive oil.

It contains 73% monounsaturated fat acids.

From the process of obtaining and processing the vegetal oils there result edible oils even very valuable but also non-alimentary, toxic oils, such as: castor oil, tung oil, hemp oil. The linseed oil, the castor oil, the rape oil, the tung oil are used as technical oils with different uses to produce glycerin, fat acids or soaps. Siccative oils such as: the linseed oil, the hemp oil and the tung oil are the raw material to produce siccative oils, paints and lacquers, printing and lithographic inks, linoleum, oilcloth and other products. Some vegetal oils are used to produce lubricants. Castor oil was cultivated from ancient times by Egyptians, Persians and Arabians, the oil resulted by pressing being used for diverse technical or pharmaceutical purposes. After having been dehydrated is used in mixture with mineral oils to grease high speed engines. It is also used to produce plastics and in the lacquers and paints industry, in the last case after a thermal treatment of pesticides and the impregnation products.

Table 2

Chemical composition of vegetal oils

Oil	Saturated fat acids, total %	Mono unsaturated acids %	Poly unsaturated acids %	Linoleic acid %	Linolenic acid %	Arahidonic acid %
Nuts	8,0	22,0	70,0	58,0	12,0	0,3
Coconut	90,0	6,0	2,0	-	traces	NC
Almonds	8,0	73,0	19,0	-	-	NC
Sesame	10,2	36,5	37,0	36,8	1,0	NC
Tomatoes	29,4	33,0	37,6	37,0	traces	NC
Grapes	14,0	57,0	29,0	29,0	0,3-1,0	NC
Peanuts	18,0	48,0	34,0	34,0	-	NC
Crocus	8,0	14,0	78,0	78,0	-	NC
Hemp	9,0	13,0	63,0	58,0	5,0	NC
Cotton	28,0	18,0	54,0	47,0	7,0	NC
Pecan nuts	9-10,8	47,3-52,2	38,7-42,5	37-45	1,2-2,4	0,5

Table 3

Characteristics of vegetal oils

Oil	Iodine index	Refraction index at t°C	Saponification index	Melting point
Nuts	147-157	1.4690-1.4695, la 40°C	190-197	NC
Almonds	100-103	1.4634-1.4641, la 20°C	190-197	NC
Pecan nuts	111-120	1.4650-1.4652, la 40°C	190	NC
Peanuts	82,7-105,1	1.468-1.472	185-206,7	NC
Soy	114-140	1.4742-1.4748, la 25°C	186-196	-20...23°C
Corn germs	111-130	1.4689-1.4736, la 15°C	188-198	-11 °C
Linen	168-205	1.4789-1.4851, la 25°C	188-196	-20 °C
Hemp	150-166	1.4700-1.4725, la 40°C	190-193	-22 °C
Castor oil plant	80-90	1.4700-1.4772, la 25°C	176-187	-10...-12 °C

Other vegetal oils, after the preliminary saponification with sodium hydroxide or calcium hydroxide, are used to produce consistent greases. The technical oils are used to prepare liquids for cutting and cooling utilized in processing metals, grinding and filing or wire drawing. In considerable quantities, the vegetal oils are also used in the pharmaceutical and cosmetic industry.

CONCLUSIONS

The safflower and corn germ oils are rich in fat acids omega 6, pro-inflammatory and with negative effects if they are consumed in excess. To neutralize these effects they recommend that these oils should be associated with oils rich in omega 3 acids as the linen oil pea nut oil or nut oil are.

The diet poor in fat acids omega 3 is the starting point for the neurodegenerative diseases, the nervous system disorders, the inflammatory and cardiovascular disorders, the cerebrovascular accidents and some cancers.

The mono and polyunsaturated fat acids found in the peanut oil and the nut oil do not increase the level of LDL (the “bad” cholesterol) in blood.

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