STUDY ON THE NUTRITIONAL VALUE OF OILS

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ABSTRACT : Edible oils can be obtained from different seeds (sunflower, soybeans, corn germs, rapeseed, grapes, cotton, sesame) or fruits (olives, nuts, peanuts, coconut, etc.) according to special technologies. In all these oils unsaturated fatty acids are in the form of *cis-cis.* The most used oils in the diet are: sunflower oil, soybean oil, olive oil, corn germ (for seasonings, frying, in the composition of dishes , preserves, semi-preserves, etc.). Margarines are an A / U type emulsion, in which water represents (A) ~ 16% and oil (U) is the fatty part which is a mixture of solid and liquid fats. The solids can be copra, palm, palmist fats, respectively more or less hydrogenated oils. Liquid oils are mainly soybean oil. Emulsification is done in the presence of a suitable emulsifier (soy lecithin, monoglycerides), and by cooling in freezers is obtained margarine that looks like butter. Natural dyes, vitamins, milk , etc. are added to the emulsification mixture . Soft margarines are also made, based on selectively hydrogenated vegetable oils, which have a higher content of linoleic acid in the respective triglycerides. The solidified edible oil can be obtained by mixing two (or more) more or less hydrogenated oils. It should be noted that hydrogenation changes the degree of unsaturation of triglycerides in oils (the change is lower in selective hydrogenation), and at the same time causes a *trans* isomerization of polyunsaturated fatty acids, *trans* fatty acids being harmful to the human body. Hydrogenation (total or partial) entails an increase in melting point but also in stability to atmospheric oxygen.

KEY WORDS: Oils and fats , nutritional value, hydrogenation

1. INTRODUCTION

Edible oils are obtained by pressing seeds or oilseeds and processing crude oil which aims to improve organoleptic properties and increase storage resistance. In Romania, at present most of the edible oils are obtained from sunflower seeds. The separation of the oil from the sunflower seeds is done in the first phase by pressing, extracting about 50% and then by extraction due to the lower content of impurities . Crude oils, both press and extraction, are refined.

Oils and fats (traditional names for glycerol esters with fatty acids) have a multiple functionality:

- **·nutritional** by:
  - providing essential fatty acids for the human body
  - concentrated energy sources (9kcal / g)
  - environment for the transport / storage of fat-soluble vitamins
  - formation of phospholipids with an essential role in the proper functioning of membranes
  - prostaglandin precursors, hormones essential for the body
- **·sensory**
  - structure and texture formers in certain products
  - palatability enhancers (lipids give fragility and reduce the feeling of dryness or granularity when eating food)
  - flavoring agents and medium for hydrophobic flavoring compounds
- **·technological** - by contributing to the structure, texture and lubricating effect, respectively by their functioning as a heat transfer medium

On the other hand, lipids are also distinguished by the diseases that a number of their constituents can cause.

Trends in lipid consumption include:

- increasing the share of vegetable fats (salad and cooking)
- decrease in animal fat consumption
- increase in the consumption of fish and foods of marine origin (due to the content of unsaturated ω-3 fatty acids and fatty acids in cis configuration)
- tendency to replace butter with shortenings, butter with margarine and whole milk with skim milk
- increasing interest in low-fat or low-fat foods obtained through the use of fat substitutes

Modern processing techniques allow the modification of one or more properties of lipids, so that starting from natural lipids leads to extremely different lipids, usually without equivalent in nature, but better adapted to the requirements of a particular product or process. These are known as ***lipid modified*** ('tailor-made Lipids'). The purpose of the change may include:

- obtaining lipids with characteristics not found in natural ones
- the use of cheaper raw materials, the finished product having the characteristics of another natural product, but much more expensive
- improving product stability
- improving palatability
- changing the crystallization mode

2. PROVIDING SUPERIOR NUTRITIONAL PRODUCTS

Refined edible oils are obtained through a special technology from various raw materials (corn, walnuts, olives, sunflower, soybeans, grape seeds, sesame, peanuts, rapeseed, cotton, etc.), but the most used are flower oil sun, soybeans, olives and corn germ. Edible oils consist mainly of triglycerides, with a water and volatile matter content of ~ 0.15% (Table 1).

Table .1 Triglyceride and fatty acid composition of various edible oils

Indicator	**Corn oil**	**. Olive oil**	**Oil of sunflower**	**Rapeseed oil**	**Soybean oil**
The amount of lipids	99.90	99,80	99.90	99 , 85	99.90
• Triglycerides	99.20	99.00	99.20	99.25	99.20
• p-sitosterin	-	0.30	0.20	0.30	0.30
The sum of the fatty acids	94.90	94.70	94.90	95.40	94.90
- Unsaturated	13.30	15.75	11.30	3.0	13.90
C 14: 0 (miristic)	-	-	-	-	traces
C 16: 0 (palmitic)	11.10	12.90	6.20	2, 30	10.30
C 18: 0 (stearic)	2.20	2.50	4.10	0.70	3.50
C 20: 0 (arahinoic)	-	0.35	0.30	-	-
- Monounsaturated	24.00	66.90	23.80	70.0	19.80

C 16: 1 (palmitoieic)	-	1.55	Traces	traces	traces
C 18: 1 (oleic)	24.00	69.90	23.70	28.10	19.80
C 20: 1 (gadoleic)	traces	0.50	ur me	8.90	traces
- Polyunsaturated	50.70	12.10	59.80	22.40	61.20
C 18: 2 (linoleic)	50.00	12.00	59.80	13.90	50.90
C 18: 3 (linolenic)	0.60	traces	-	8.50	10.30

Margarine is a stable emulsion obtained from selectively hydrogenated vegetable oils or vegetable plus animal, with milk or water, respectively with additives (vitamin A, D_2, sugar, milk, salt, emulsifiers, stabilizers, starch, natural dyes).

The following types of margarine are manufactured:

• Table margarine (type M)

• Margarine for bakery, pastry, confectionery (type P)

• Spreadable margarine (type T)

• Low-calorie margarine (type H).

The nutritional value of margarine through the fatty component is lower than the oils because by selective hydrogenation the amount of polyunsaturated fatty acids is reduced. However, the nutritional value increases due to additives (milk, sugar, vitamins).

3. SENSORY CHARACTERISTICS AND PHYSICO-CHEMICAL PROPERTIES

The sensory characteristics and physico-chemical properties of edible oils are shown in Tables 2 and 3. The sensory quality and physico-chemical properties of edible oils may be affected by:

- oxidative degradation (aldehyde rancidity) under the influence of atmospheric oxygen and light;
- thermal degradation (frying).

Margarine has a number of sensory properties that make it sought after by consumers. In addition to sensory properties, margarines must correspond to physico-chemical properties (Table 4).

Table 2. Sensory characteristics of edible oils

Characteristics	**Oil of sunflower Sunflower**	**Soybean oil**	**Oil from germs of maize**	**Oil mixture 80% flower sun and 20 \ soy**
appearance • at 60 ° C for non-bottled oil • at 15 ° C for the oil	Clear, without suspensions and without sediment	Clear, without suspensions and without	Clear, without suspensions and without sediment	Clear, without suspensions and stuffing sediment

in the packaging outlets		sediment		
Color	Yellow	Yellowish to reddish yellow	Yellow	Yellow
Taste and smell	Pleasant, without foreign smell and taste	Characteristic, without smell and taste foreigner	Pleasant, without foreign smell and taste	Pleasant, without foreign smell and taste

Table 3. Physico-chemical properties of edible oils

Characteristic	**The type of oil**							
	Flower sun		**Soy**		**Corn germ**		**Mixture**	
	A	B	A	B	**A**	**B**	**A**	**B**
1	2	3	4	5	**6**	**7**	**8**	**9**
Free acidity, expressed as oleic acid,%, maximum	0.1	0.35	0.15	0.40	0.20	0.40	0.10	**0.40**
Iodine color, mq 1/100 cm ^{3}, maximum	7	9	18	18	15	**18**	10	**1Q**
Water and volatile substances, %, maximum	0.06	0.13	0.06	0.15	0.10	0.15	0.06	**0.15**
Insoluble impurities in ethyl ether ,%, maximum	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Soap,%, maximum	0.02	0.06	0.05	0.07	0.05	0.07	0.03	0.07
Unsaponifiable organic substances,%, maximum	1	1	1.2	1.2	2	2	1.1	1.1

Table 4. Physical and chemical properties of margarine

Characteristics	**Type M**		**Tipp**
	Variant I	**Variant II**	
Fat,%	82.5 ± 1	67 + 1	82.5 ± **1**
Water,%, max.	16.5	33	16.5
Sliding melting point, ° C	GL..35	31 ... 35	**31 ... 38**
Acidity, degrees, max.			
- margarine without milk	1.3	3	**1.3**
- margarine with milk	3	4	**-**
Sodium chloride,%, max.	0.60	0.40	0.60

Vitamin A, Ul / kg min.	20000	16000	-
Starch	Present	Present	present

The oil used for frying (donuts, sausages, potatoes, etc.) can no longer be fused when it has accentuated color changes and suspensions or sediment s 60 ° C, acidity (as oleic acid - maximum 1.5%) and peroxide index over 15 mq / kg

Solidified edible oil. This oil is obtained by mixing **two** or more vegetable oils (soybean, sunflower), refined and hydrogenated. c_ different melting points, which are intimately mixed in a mixer. This oil must = correspond to the following sensory properties:

- Appearance and consistency at 20 ° C: creamy, compact, unbreakable mass
- Color: white to yellowish-white, without differently colored spots or layers;
- Smell and taste: pleasant, without bitter taste, rancid, without foreign taste and smell. The physico-chemical properties are the following:
- Sliding melting point, ° C 33 ... 36
- Free acidity expressed in oleic acid,%, maximum 0.40
- Water and volatile substances,%, maximum 0.15
- Unsaponifiable organic substances,%, maximum 1,2
- Soap,%, maximum 0.07
- Pb, mg / kg, maximum 0.1
- Cu, mg / kg, maximum 0.4

4. HYGIENIC QUALITY OF OILS AND MARGARINS

From a microbiological point of view, crude oil must not contain more than 100 yeasts and molds / ml. Margarine must meet the following microbiological indicators.

Table 5. Microbiological indicators .

Indicator	**Margarine of consumption [germs / g]**	**Margarine with milk [Germs / g]**
• Total number of mesophilic aerobic germs	100	100
• Coliform bacteria	**10**	**10**
• *Escherichia coli*	abs.	abs.
» *Salmonella* at 25 g	abs.	abs.
• Coagulase-positive staphylococci	abs.	abs.
• *Bacillus cereus*	.	_
• *Vibrio parahaemolyticus*	.	.
« Sulfur-reducing bacteria	_	.
• Yeasts and molds	100	100

The heavy metal content of edible oils and margarines must be within the maximum levels shown in Tables 6 and 7 . Hygienic quality of the oils is modified by oxidation in the presence of 0_2 atmosphere and light and their repeated use in frying (accumulate toxic substances such as peroxides, dimers, trimers, tetramers, polymers).

Table 6. Heavy metal content of edible oils

Indicator	Admissibility conditions
Lead, mg / kg, maximum	0.1
Copper, mg / kg, maximum	0.4
Zinc, mg / kg, maximum	5
Arsenic, mg / kg, maximum	0.05

Table 7. Heavy metal content of edible oils and margarine

Metal	Permitted level [mg / kg]
Arsenic	0.1
Cadmium	0.05
Lead	0.5
Zinc	5.0
Copper	0.5
Mercury	0.05

CONCLUSIONS

It follows that the nutritional value of vegetable oils consists in their content in polyunsaturated fatty acids and especially in linoleic acid, which plays an important role in:

- maintaining the integrity of cell membranes (physical function) and their fluidity (by acylation in phospholipids). This ensures an optimal topography of enzymes, substrates, metabolites, so that the action of enzymes on substrates becomes optimal;
- prevention of cell fragility;
- minimizing water losses;
- ensuring the integrity of mitochondria and therefore an efficient energy metabolism;
- decrease in the level of steric cholesterol and plasma triglycerides and therefore decreases the tendency to install atherosclerosis;
- reducing the tendency of thrombosis by preventing the aggregation of figurative elements;
- reducing the duration of blood clotting;
- prevention of hypertension caused by dietary NaCl;
- improving the performance of the heart by maintaining its integrity and the vascular system;
- regularization of biochemical abnormalities during senile diabetes and obesity;
- improving the "clearing" of blood that "cleanses" of lipids;
- improving postheparin clearance and microsomal activity;
- providing processes for the production of prostaglandins, which are modules ter chemical that occurs at the cellular level, influencing the synthesis of cyclic AMP. The effect of prostaglandins is manifested on the cardiovascular system, platelet behavior, blood pressure and tissue lipolysis.

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