PRELIMINARY DATA AND ANALYTICAL TESTS OF SOME FOOD OILS FROM THE COMMERCIAL NETWORK OF TOWN IAŞI

DATE PRELIMINARE ŞI TESTĂRI ANALITICE ALE UNOR ULEIURI ALIMENTARE PROVENITE DIN REŢEAUA COMERCIALĂ A MUNICIPIULUI IAŞI

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Abstract. *The commercial units from Iaşi from where come the samples studied are Carrefour, Gimma, Kaufland, Sellgros. In the vegetal oils, the contents of phosphatides and colouring substances vary between 1 and 2%. The contents of phosphatides from the crude oils vary depending on the nature of the raw material and technology (press oil or extraction oil). From the crude oils, phosphatides may be recovered by the process of hydration under the form of a mixture improperly called "lecithin". Among the colouring substances, the most frequently met in vegetal oils are: chlorophyll (oil olive, pumpkin oil, mixed oil), gossypol (cotton oil), sesamol (sesame oil), carotene (corn oil), xanthophyll etc. Among the substances always accompanying the glycerides (triacil glycerols) from the crude oils, we can also find the free fat acids that are extracted from oil by alkaline neutralization. Through the refining process, they remove all those accompanying substances to make oil able to be used in alimentation or to insure the organoleptic features required by the standards within the validity terms.*

Rezumat. *Unităţile comerciale din Iaşi din care provin probele studiate sunt Carrefour, Gimma, Kaufland, Sellgros. În uleiurile vegetale, conţinutul de fosfatide şi substanţe colorante variază între 1 şi 2%. Conţinutul de fosfatide din uleiurile brute variază în funcţie de natura materiei prime şi de tehnologie (ulei de presă sau ulei de extracţie). Din uleiurile brute, fosfatidele se pot recupera prin procesul de hidratare, sub forma unui amestec impropriu numit „lecitină". Dintre substanţele colorante, cele mai răspândite în uleiurile vegetale sunt: clorofila (uleiul de măsline, uleiul de dovleac, uleiul amestec), gosipolul (uleiul de bumbac), sesamolul (uleiul de susan), carotenul (uleiul de porumb), xantofila etc. Între substanţele care însoţesc permanent gliceridele (triacil glicerolii) din uleiurile brute se găsesc şi acizi graşi liberi, care se îndepărtează din ulei prin neutralizare alcalină. În urma procesului de rafinare se îndepărtează toate aceste substanţe de însoţire, pentru a face uleiurile apte de a fi folosite în scopuri alimentare sau pentru a asigura caracteristicile organoleptice cerute de standarde în cadrul termenelor de garanţie şi de valabilitate.*

MATERIAL AND METHODS

We effectuated the analyses in the interval February-March 2008. The material used was taken from shops having different origins and manufacturing methods depending on the producer. The oils analyzed were the following: pumpkin oil, peanut oil,

Through the analyses effectuated, according to the existing standards, we determined acidity (% oleic acid) in accordance with STAS 145/67 part 16, alkalinity (mg sodium oleate /kg) in accordance with SR EN ISO 10539, the phosphor contents (mg/kg, after our own method), the iodine colour (%) in accordance with STAS 145/2-78, the chlorophyl contents (mg/kg), according to AOCS Cc 13d-55 and the caroten contents (mg/kg).

The free acidity of the oil under study was determined in accordance with STAS 145-67 part 16. The free acidity is the percentage of fat acids found in the oil analyzed and is expressed conventionally in the most representative fat acid. For the common oils from soy, sunflower, peanuts, pumpkin they express it in oleic acid; for the coconut and palmist oil they express it in lauric acid; for the palm oil they express it in palmitic acid; for the castor oil they express it in ricinoleic acid; for the rapeseed they express it in erucic acid. The work method consists in dissolving a quantity of oil in a mixture of alcohol-ether, afterwards it is titrated with a solution of sodium or potassium hydroxide in the presence of the indicator phenolphthalein. The appearance of the pink coloration indicates that all free fat acids were neutralized. By acidity index we understand the quantity in mg of potassium hydroxide necessary to neutralize the free fat acids from a gram of fat matter.

Oils may contain natural alkaline constituents (calcium soaps from bones) or accidental (sodium soaps from the improperly refined oils). The method principle (in accordance with SR EN ISO 10.539) to determine the contents of soaps from a sample consists in dissolving it in a warm mixture of acetone-water and its titration with chlorine hydride. Alkalinity may be expressed as a percentage of sodium hydroxide or in mg of sodium oleate per keg of sample.

The method principle to determine the contents of phosphor relies on the destruction of the organic matter by mineralization in the presence of magnesium oxide. The dissolving of ash and the formation among the phosphoric ions and molybdenum and vanadium ions of the complex ammonium phospho-vanado-molybdate gives a stable yellow coloration. The intensity of coloration is measured by spectrophotometer for a wave length of 390 nm as against a blank test obtained from distilled water and nitro-vanado-molybdenic reagent.

The iodine colour was determined by spectrophotometer measurement of light absorbance through oil for a wave length of 420 nm, on a UV/VIS spectrophotometer, as against an approval solution where the sample was replaced by water.

In the presence of the atmospheric oxygen, fat acids from the composition of fats may oxidize partially forming peroxides or hydro-peroxides. The determination of the peroxide index relies on the property of the fat peroxide to react in an acid environment with potassium iodide freeing iodine that is afterwards titrated with tiosulphate.

The method to determine the contents of chlorophyl relies on spectrophotometer measurement of monochromatic light absorbance through oil between 600-750 nm. The readings were effectuated for a wave lenght of: 630-670-710 nm, on a UV/VIS spectrophotometer, as against an approval solution where the sample was replaced by hexan. The contents of chlorophyl found in the oil analyzed is expressed in mg/kg oil (ppm).

The contents of caroten pigments in oil was determined by spectrophotometer measurement of light absorbance through oil for a wave length of 420 nm, the rezults was expressed in mg/kg oil (ppm).

The oils we analyzed are presented in table 1.

Table 1

Oils assortments under study

No. crt.	Oil	Producer	Using	Other indications according to label
1	Pumpkin oil Pepon 250ml	S.C. Parapharm S.R.L., Romania	terapeutical purpose	rich in polyunsaturated fat acids, Se, vitamin E. obtained by cold pressing
2	Pumpkin oil Emi 200ml	S.C. 2E-Prod S.R.L., Romania	terapeutical purpose	rich in vitamines: A, D, E, K; polyunsaturated fat acids, Zn, Fe, Mg, caroten. obtained by cold pressing
3	Peanut oil 1000ml	Carrefour, France	ideal for salads, frying, cooking	contain peanut oil temperature recommended for frying 180ºC.
4	Unrefined maize oil Capitano 1000ml	S.C. Man Ro S.R.L., Romania	ideal for culinary purpose	contain: polyunsaturated fat acids, high level of tocopherol and vitamin E, carotenoides nutritional factors for 100 ml: fats 100 g, out of which monounsaturated 33g, polyunsaturated 55g, saturated 12 g. temperature recommended for keeping 10-25ºC.
5	Mixt oil Olivero 500ml	Costa d Oro, Italy	ideal for salads and cooking	ingredientes: grape seed oil, rape seed oil, rice oil, maize oil, sesame oil source of vitamin E, omega 3, omega 6, gamma oryzanol, sesamol, sesaminol, sesamin nutritional factors for 100 ml: fats 92 g, out of which monounsaturated 33g, polyunsaturated 46g, saturated 13 g. temperature recommended for keeping 10-25ºC.
6	Sun flower oil Unisol 1000ml	Interoil S.A. Oradea pentru Bunge Romania	ideal for culinary purpose	refined sunflower oil keep in cool and dark places
7	Sesame oil 150ml	Costa şi Co Ltd. Aylesford, Great Britain	used in eastern kitchen, gives a nutty taste to salads, sauces, macaroni, even fryingt	nutritional factors for 100 ml: proteins 4,1g, carbohydrates 32g, out of which glucides 25,g; fats 92 g, out of which saturated 14,7 g.

RESULTS AND DISCUSSIONS

The unrefined oils have a higher free acidity than the refined ones (tab. 1 and tab 2). Thus, the maise oil has an acidity of 1,78% expressed in oleic acid.

Through the determination of the oil alkalinity (tab. 2 and tab.3) we identified low value for the pumpkin oil Pepon (soap 1 mg/kg).

Table 2

Determination of acidity, alkalinity and phosphor contents from the unrefined oils

Oil	Acidity% oleic acid	Alcalinity mg/kg	Phosphor mg/kg
Pumpkin oil Pepon	0,61	1,0	6,25
Pumpkin oil Emi	0,70	absence	6,97
Maize oil Capitano	1,78	absence	0,5
Sesame oil	1,81	absence	30,86

Table 3

Determination of acidity, alkalinity and phosphor contents from the refined oils

Oil	Acidity% oleic acid	Alcalinity mg/kg	Phosphor mg/kg
Peanut oil	0,05	absence	0,02
Sun flower oil Unisol	0,08	absence	2,15
Mixt oil Olivero	0,11	absence	0,4

Higher values of the phosphor contents were registered for the unrefined nut oil, such as in sesame oil- 30,86 mg/kg. The unrefined peanut oil presentes a low content of phosphor-0,02.

Table 4

The content in coloured substances (us=unsignificantly)

Oil	Iodine colour %	Caroten mg/kg	Chlorophyl mg/kg
Pumpkin oil Pepon	Correspond	17,4	3,61
Pumpkin oil Emi	Correspond	20,05	US
Peanut oil	80,7	NS	US
Maize oil	Correspond	17,0	US
Sun flower oil	74,0	NS	US
Mixt oil	Correspond	NS	1,81
Sesame oil	Correspond	7,08	US

After determining the iodine colour (tab. 4) we could notice that the arachis oil and the sunflower oil had the most favourable index (80,7% and 74%), their hue insuring superior organoleptic characteristics.

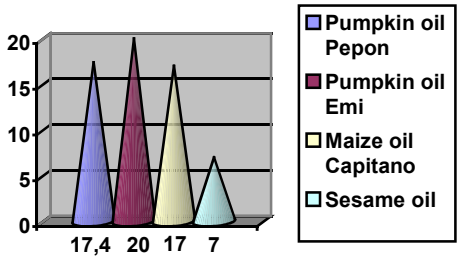

Fig.1 – The content in carotene (%)

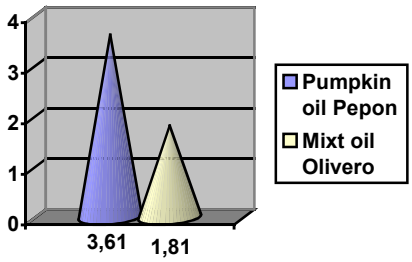

Fig.1 – The content in chlorophyl(%)

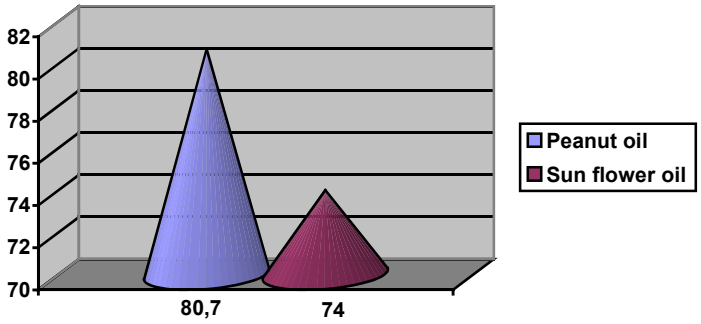

Fig.1 – The content in iodine colour (%)

As for the content in colouriung substances (tab. 4), the pumpkin oil and the maise oil have a high content of carotenes: 20,05 mg/kg (pumpkin oil Pepon) and 17 mg/kg (maize oil).

Pumpkin oil Pepon has, also, the highest content of chlorophyl (3,61mg/kg) of all oils analized. A low content of chlorophyl we determined in the mixt oil (1,81 mg/kg).

CONCLUSIONS

1. The free acidity of the unrefined oils are higher than those of the refines oils. The maize oil has an acidity of 1,78% expressed in oleic acid. These oils may be kept for a shorter period of time (up to 12 months), at low temperatures and in dark places.

2. Alkalinity registers low value for the pumpkin oil Pepon (soap 1mg/kg). The unrefined oils do not register soap traces because the technology of obtaining these oils doesn't suppose chemical treatment.

3. The unrefined sesame oil registers a high level of phosphor. The refined peanut oil registers low phosphor level, as we already expected.

4. The peanut oil and the sunflower oil had the most favourable index for the iodine colour and their hue insures superior organoleptic characteristics.

5. The unrefined pumpkin and maize oils had the highest content in caroten, in correlation with the raw material content, therefore increase their nutritive values.

6. The pumpkin oil registered the highest content in chlorophyl of all oils.

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