

DETERMINATION OF VITAMIN E CONTENT IN SUNFLOWER OILS AVAILABLE ON THE ROMANIAN MARKET

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Abstract. Vitamin E is soluble in fat and alcohol, withstands temperatures up to 250°C, but is sensitive to light and oxygen. Very high or very low temperature values reduce the amount of tocopherol in food by up to two-thirds. 12 samples of different types of sunflower oil were analyzed using HPLC with fluorescent detector. The total tocopherols amount was between 150-930 mg/l. The highest concentration was found in cold press sunflower oil, stored in dark glass bottles and the lowest in store bought sunflower oil, in PET packaging. α -Tocopherol had the highest concentration from all the other tocopherols, analyzed (β -Tocopherol, γ -Tocopherol, δ -Tocopherol). In some samples of sunflower oil, in PET packaging β -Tocopherol, γ -Tocopherol, δ -Tocopherol were under the detection limit. Sunflower oil no matter the technology used for it's production it's a an important source of α -Tocopherol.

Keywords: tocopherols, HPLC, sunflower oil, cold press

INTRODUCTION

Vitamin E is also called tocopherol, a name given to it after the discovery of its role in reproduction. Tocopherols are quite fat-soluble substances, especially in the vegetable kingdom. The term vitamin E is used to refer to eight natural essential fat-soluble nutrients (4 tocopherols and 4 tocotrienols). Vitamin E, also called the fertility vitamin, was discovered in wheat germ in 1922. Researchers then observed that this vitamin is essential for the reproduction of rats. [1-3]

Vitamin E is a major fat-soluble antioxidant, responsible for protecting membranes against lipid peroxidation. The antioxidant properties of vitamin E that acts on free radicals could slow down the biological aging process. In humans, vitamin E deficiency can cause neurological and cardiovascular dysfunction and a reduced lifespan of erythrocytes. In food, vitamin E is found in vegetable oils, such as palm, corn and soy. Vitamin E, through its antioxidant role in the body, helps prevent pathological processes associated with the presence of free radicals in the cardiovascular, neuromuscular, ocular and oral cavity. Vitamin E is soluble in fat and alcohol, withstands temperatures up to 250°C, but is sensitive to light and oxygen. Very high or very low temperature values reduce the amount of tocopherol in food by up to two-thirds. In nature, tocopherols are widespread, especially in the plant kingdom. Corn germ and vegetable oils are the main source of tocopherols. In general, cereal grains contain all four isomers of tocopherol in varying proportions. Corn grains have the highest amount of tocopherols. [2-6]

The purpose of the study was to evaluate the vitamin E content of different sunflower oils available on the Romanian market in order to establish the variation across type of technology used for the production and region of origin.

MATERIAL AND METHODS

Samples

The sun flower oils samples were collected from different producers from Cluj County and some were bought from different stores (Table 1).

Table 1

Source of sample		
Crt. No.	Sample type	Source of sample
1.	Cold press sunflower oil, in dark glass bottles	Luna, Cluj County
2.	Cold press sunflower oil, in PET packaging	Luna, Cluj County
3.	Cold press sunflower oil, in PET packaging	Pata, Cluj County
4.	Cold press sunflower oil, in PET packaging	Aiud, Alba County
5.	Cold press sunflower oil, in PET packaging	Gherla, Cluj County
6.	Store bought sunflower oil, cold press, in PET packaging	Gherăseni. Buzau County
7.	Store bought sunflower oil, cold press, in PET packaging	Somcuta Mare, Maramures County
8.	Store bought sunflower oil, in PET packaging	Oradea, Bihor County
9.	Store bought sunflower oil, in PET packaging	Bucuresti
10.	Store bought sunflower oil, in PET packaging	Buzau, Buzau County
11.	Store bought sunflower oil, in PET packaging	Ploiesti, Prahova County
12.	Store bought sunflower oil, in PET packaging	Craiova, Dolj County

Reagents and standards

ISO-propanol, methanol and acetonitrile were HPLC Grade from Merk. All standards used for the calibration curve were from Sigma Aldrich: (\pm)- α - Tocopherol, synthetic, $\geq 96\%$ (HPLC), 100G, rac- β - Tocopherol, (+)- γ - Tocopherol $\geq 96\%$ (HPLC), 100MG, δ -Tocopherol. Ultra-pure water was obtained using a water filtration system from Siemens.

Determination of vit E

The sums of α -tocopherol β -tocopherol γ -tocopherol and δ -tocopherol was used for the evaluation of vit E content in different sunflowers oils analyzed. Samples were diluted with iso-propanol (1:100) and filtered using a 0.45 μ m cellulose filter. Liquid chromatographer with fluorescent detector (HPLC-FLD), Series 200 for Perkin Elmer was used for the determination of tocopherols. The method is described elsewhere [7].

RESULTS AND DISCUSSION

The results obtained for each sample analyzed is presented in table 2 and figures 1-6

β -Tocopherol, γ -Tocopherol, δ -Tocopherol were under the detection limit in Oradea sunflower oil, in PET packaging from Bucuresti, Oradea, Buzau, Ploiesti and Craiova

α -Tocopherol was found in all samples with a concentration that ranged between 150.99-842.36 mg/l. The highest value of the total tocopherol content was

determined in cold pressed oil, in dark glass bottles, in the Luna area, Cluj-Napoca (930.81 mg/l).

Table 2

Results obtained for each sample

Crt. no.	Sample type	Concentration mg/l			
		α -Tocopherol	β -Tocopherol + γ -Tocopherol	δ -Tocopherol	Total
1.	Cold press sunflower oil, in dark glass bottles	842.36	57.91	30.54	930.81
2.	Cold press sunflower oil, in PET packaging	720.31	40.12	24.03	784.46
3.	Cold press sunflower oil, in PET packaging	690.67	39.17	20.03	749.87
4.	Cold press sunflower oil, in PET packaging	730.34	30.68	10.34	771.36
5.	Cold press sunflower oil, in PET packaging	710.98	30.75	15.06	756.79
6.	Store bought sunflower oil, cold press, in PET packaging	680.34	24.01	10.67	715.02
7.	Store bought sunflower oil, cold press, in PET packaging	650.98	20.37	8.37	679.72
8.	Store bought sunflower oil, in PET packaging	152.97	<LQ	<LQ	152.97
9.	Store bought sunflower oil, in PET packaging	163.79	<LQ	<LQ	163.79
10.	Store bought sunflower oil, in PET packaging	169.18	<LQ	<LQ	169.18
11.	Store bought sunflower oil, in PET packaging	150.99	<LQ	<LQ	150.99
12.	Store bought sunflower oil, in PET packaging	170.39	<LQ	<LQ	170.39

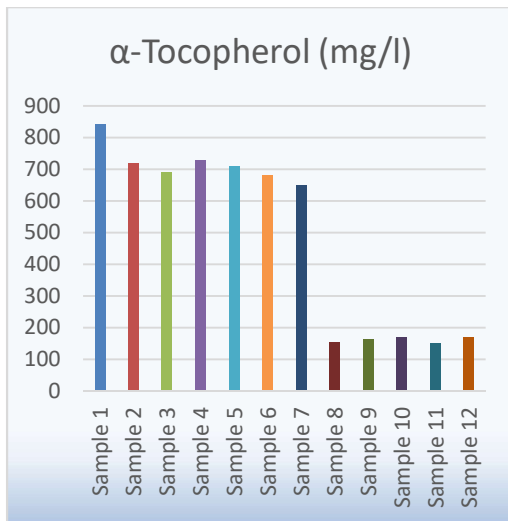


Fig. 1. α -Tocopherol concentration in sun flower oil samples

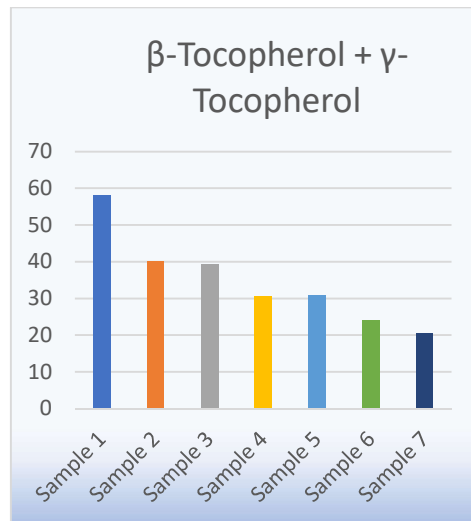


Fig. 2. β -Tocopherol + γ -Tocopherol concentration in sun flower oil samples

The total content of tocopherols in cold-pressed sunflower oil from local producers (798.6 mg/l) has a higher value than sunflower oils bought from the store (697.3 mg/l).

Cold pressed sunflower oil in dark glass bottles (930.81 mg/l) has a higher content of total tocopherols than the sunflower oil in PET packing (478.5 mg/l).

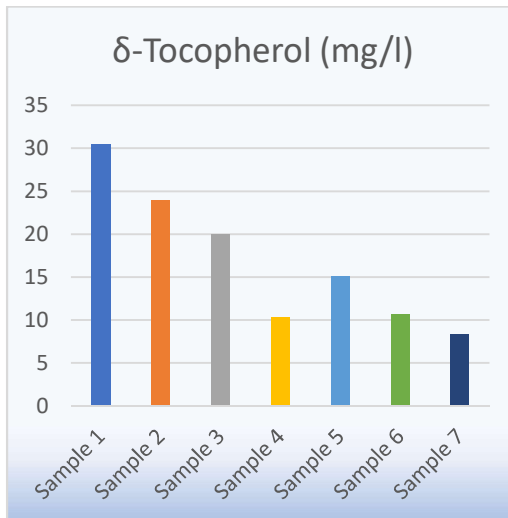


Fig. 3. δ -Tocopherol concentration in sun flower oil samples

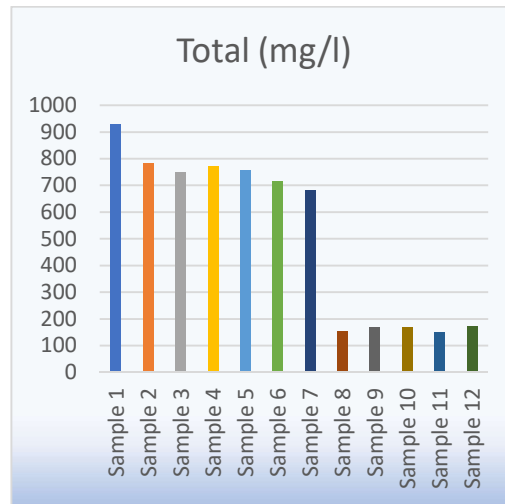


Fig. 4. The total concentration of tocopherol in the sunflower oil samples

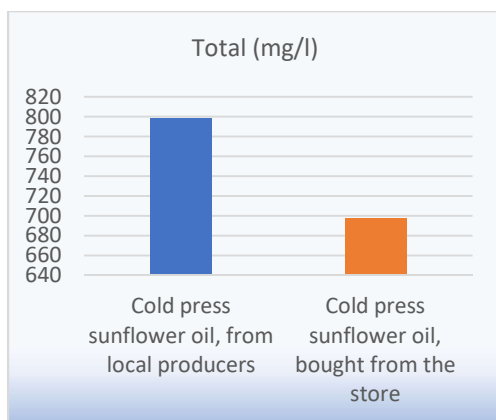


Fig. 5. Comparison of the average total concentration of tocopherol in cold-pressed oil from local producers with sunflower oil bought from the store

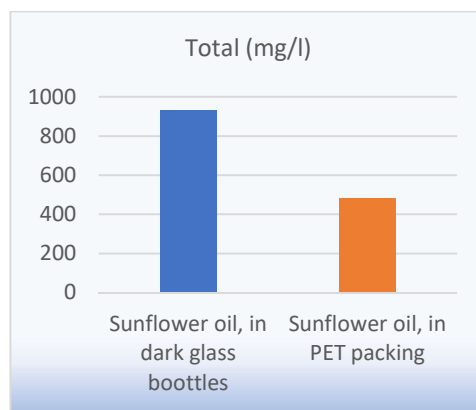


Fig. 6. Comparison of the average total concentration of tocopherol in sunflower oil, in dark glass bottles with sunflower oil, in PET packing

CONCLUSIONS

The results obtained prove that sunflower oil is very important source of tocopherols, especially α -Tocopherol. The packing and production technology has a major impact on the tocopherols profile found in the sunflower oils and it can be used to determine if the oil was cold pressed or not.

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