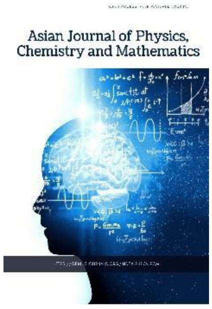

Study Of Triglycerides in Vegetable Oils by Gas Chromatography

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ABSTRACT

As a result of this work, oils extracted from some melons were converted to methyl esters and identified using gas chromatography, followed by quantitative evaluation. It has been shown that gas chromatography can be used to assess the composition and authenticity of vegetable oils. Vegetable oils include watermelon, melon and squash oils from melons.

Such an approach can be applied in the standardization of the quality of oils, in the development of regulatory documents related to oils.

Keywords: Oils, gas chromatography

Introduction.

The oil and fat industry is one of the leading branches of the food industry of the Republic of Uzbekistan, providing the population and the economy with vegetable oils, fats, as well as products made from them. Vegetable oils contain saturated and one or two double unsaturated fatty acids. In the analysis of vegetable oils, the quantitative composition of oleic and linoleic acids must meet the requirements regulated by the Codex Alimentarius standard. The production and use of vegetable oils require constant monitoring of their fatty acid content.

This article focuses on the results of chromatographic studies of the fatty acid content of vegetable oils grown in the regions of the Republic of Uzbekistan, as well as the assessment of quality indicators of food products using modern methods of analysis.

The most common lipids in nature are fats and oils. Despite their complexity, they are composed mainly of glycerin and triacylglycerols, which are esters of high molecular weight fatty acids. Vegetable oils are extracted from oily raw materials, ie plants, by pressing and extraction using various solvents. [1]. Triglycerides make up 95-97% of vegetable oils [1-2].

In the following years, with the development of the oil industry, new products began to be produced. These include high-grade refined and packaged fats, new types of margarine and mayonnaise. At present, some small-scale oil and gas enterprises have been established to produce oil from melon seeds.

Melons belong to the group of cultivated crops grown for food, fodder and technical purposes. The most widely grown and important of these are watermelons, melons and squash. The fruit of melons is a valuable food product with dietary properties, as well as given to livestock as feed. Oil is extracted from their seeds.

Fats are one of the main products in the diet of the population. When properly selected and consumed, fats play an important role in ensuring a healthy diet. According to the recommendations of the World Health Organization, the consumption of fats and oils is required to provide 15-30% of the caloric content of the diet, and saturated fatty acids should not exceed 10% of the total caloric content in the diet. It is also known that trans fatty acids should not exceed 1% of total calories. The presence and ratio of polyunsaturated fatty acids omega-6 and omega-3 in fats are also very important.

The nutrition requirements of the population in our country are determined by the sanitary norms and rules "Nutritional requirements of the population: norms of physiological need for energy and nutrients for different groups" harmonized with the international principles of healthy eating. However, one of the ways to solve the problem of production of oils and fat products that meet modern views on food hygiene is the production of fatty products, which contain not only animal fats but also various types of vegetable oils widely used.

There are very strict requirements for the production of oil products and methods of controlling their components. Conventional physicochemical parameters determined by simple methods of chemical analysis, such as acid number, iodine number, peroxide number, hydroxide number, saponification number, refractive index, density, viscosity, group composition of oils, and a number of other co. determination of indicators will not be sufficient to assess the quality of oil products.

Chromatographic methods are now widely used to study the composition of these products in depth and in detail. Chromatographic methods, in particular gas-liquid chromatography, are the main method of analyzing the fatty acid content of oils. [3-4]. Chromatographic methods are characterized by their accuracy, expressiveness, versatility, the ability to automate the separation process, simplicity and remote control.

In order to determine the vegetable oils to be tested by gas chromatic methods, it is advisable to convert them to methyl esters. This is because the boiling point of the methyl esters of fatty acids is much lower than that of the corresponding acids, which greatly facilitates the process of chromatographic separation.

Based on the above, the purpose of this work is to study the fatty acid content of oils from melons grown locally using chromatographic methods, as well as identification and quantitative assessment on the basis of modern methods.

The experimental part. To conduct the study, an analysis of watermelon, melon, pumpkin oil grown in the regions of the Republic was conducted. To do this, oil was extracted from the samples of vegetable oils to be tested by extraction using a known method [1]. The amount of oil extracted from the sample was 40-55%.

The preparation of methyl esters of vegetable oils was carried out according to the appropriate method [5]. Thus the methyl esters of the oils being tested were prepared for gasochromatic analysis.

Gas chromatic analysis of methyl esters of these oils was performed using Krystal-Chromatek 9000 gas chromatograph with a stationary liquid SE-30 phase capillary column with an inner diameter of 0.25 mm and a length of 30 m. [6]. For complete separation of methyl esters of fatty acids, a temperature-programmed separation mode was selected (isothermal mode at 140 ^{0}C for 4 minutes, then the temperature was raised to 3 ^{0}C / min at 180 ^{0}C) and this temperature was maintained for 10 minutes. then the programmed temperature was maintained at 3 ^{0}C / min at 240 ^{0}C for 25 minutes at the final temperature; evaporator temperature was 300 ^{0}C; sample volume was 0.1 μl, flame ionization detector-AID temperature was 300 ^{0}C, mobile phase-nitrogen flow rate was 70 ml/min, hydrogen flow rate was 25 ml / min, air flow rate was 250 ml / min. Gasochromatic analysis of methyl esters of the oils being tested under these selected optimal conditions was performed. The chromatogram obtained in the analysis of pumpkin oil in the experiment is shown in Figure 1 [7].

The analysis of the quality of methyl esters of fatty acids in the studied oils was performed on the basis of the retention values obtained as follows:

1. Using a set of individual components estimated in the "Witness" method;

2. Using the results obtained in the scientific literature, tables, on the basis of previous scientific research for the estimated substances in the absence of standard, pure substances;

3. Using the various correlations between the retention values and the physicochemical characteristics of the sorbents and sorbents, if the above conditions do not allow;

4. Structure - using the method of group builders.

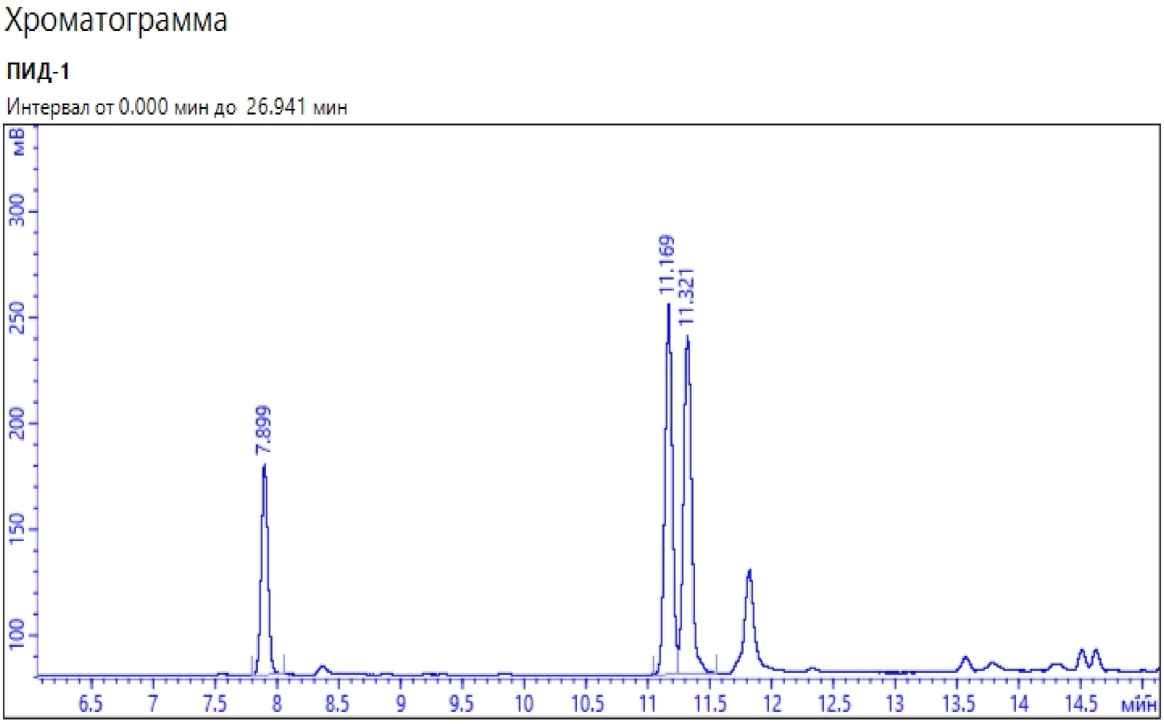

Figure 1. Chromatogram of methyl ether of pumpkin oil obtained by GX method.

In the last three cases, the fact that the mean squared deviation between the calculated and experimentally captured retention indices of the presumed component as the criterion for identification corresponds to the identification error confirms that the identification was performed correctly. Identification is completed by compiling a list of the components of the mixture being analyzed.

Quantitative composition of methyl esters of fatty acids is carried out by the method of internal normalization [8]. The quantitative results obtained are presented in Table 1.

According to the results, the percentage of fatty acids in vegetable oils is given in Table 1:

Table 1.
Fatty acid content of melon oil:

№	Yog' kislotalar nomi	Tarvuz, %	Qovun, %	Qovoq, %
1	Miristin ($C_{14:0}$)	0,06	0,06	0,08
2	Palmitin ($C_{16:0}$)	10,43	11,43	10.72
3	Pal'metolein ($C_{16:1}$)	0,21	0,07	0,24
4	Stearin ($C_{18:0}$)	5,63	6.82	5,40
5	Olein ($C_{18:1}$)	24,82	20,53	37.73

6	Linol ($C_{18:2}$) (vitamin F)	57.49	60,31	44.74
7	Linolin ($C_{18:3}$)	0.46	0,19	0,33
8	Araxin ($C_{20:0}$)	0,35	0,16	0,37
9	Gondoin ($C_{20.1}$)	0,24	0.14	0.11
10	Begen ($C_{22:0}$)	0,31	0.29	0.28

The results of the table above show that the content of unsaturated fatty acid linoleic acid in melon oil is much higher than in other plants.

If you look at the amount of oleic acid in melons, you can see that it is twice as much in pumpkin oil as in melon oil, and much higher than in watermelon oil, which is almost twice as low.

Compared to the total amount of unsaturated acids in these oils, their content in pumpkin oil was 88.50%, in watermelon oil 88.53% and in melon oil 81.75%.

In general, the high content of unsaturated fatty acids in watermelon oil can be considered as the main feature that makes this oil widely used in consumer purposes, pharmaceuticals, medicine, cosmetics and other fields.

Based on the qualitative and quantitative composition of vegetable oils, it is possible to assess their nutritional value, biological activity and use for various purposes. Consumption of melon and pumpkin oil helps to regulate many physiological processes. They are used as a remedy in diseases of the kidneys, stomach, liver, atherosclerosis, bronchitis, tuberculosis, boils and anemia.

Conclusion. Thus, it was found necessary to constantly monitor the content, quality, authenticity of fatty acids in the production and use of vegetable oils and especially their mixtures. It has been shown that chromatographic methods, in particular gas-liquid chromatogramography, can be used to obtain detailed information by analyzing the fatty acid content of vegetable oils [8]. Based on the study of the quality and quantitative composition of melon extract oils, it was confirmed that it can be used for evaluation and therapeutic purposes.

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