



GAS CHROMATOGRAPHIC ANALYSIS ON FATTY ACIDS OF PUMPKIN SEED OIL OF “SPANISH 73” VARIETIES

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ABSTRACT: In this work, the fatty acid composition of pumpkin seed oil of the Spanish 73 variety was studied by gas chromatography. The main physical and chemical parameters of pumpkin seed oil obtained from the seeds of the variety “Spanish 73” by extraction with hexane have been established. It was revealed that pumpkin oil “Spanish 73” mainly consisted of such unsaturated fatty acids as linoleic (54.027 ± 2.729) and oleic (18.107 ± 1.139). The total content of unsaturated fatty acids is 73.292 ± 3.725 of the total content of fatty acids, which is a source of useful fatty acids.

KEYWORDS: pumpkin, oils, seeds, fatty acids, gas chromatography, composition.

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INTRODUCTION

Pumpkin is the most ancient melon culture [1,2]. Pumpkins were used as vegetables in unripe and ripe form, they were boiled, stewed, fried; cooked into a variety of dishes rich in starch and sugar [3-6].

Pumpkin seeds have also been used in nutrition, for oil production (oil gourd), in the manufacturer of confectionery products and in medicine as an effective remedy against helminths, for the treatment of hypertension, prostatic hyperplasia and inflammation of the bladder [7], as well as for the treatment of erysipelas [8]. High consumption of pumpkin seeds prevents the formation of kidney stones, reduces the risk of developing cancer of the gastrointestinal tract, breast, lung and rectum [9].

Pumpkin seeds are known for their nutritional value and a wide range of biological activities. They contain significant amounts of essential fatty acids (up to 50%), proteins (about 30%), sugars, phytosterols,

B vitamins, ascorbic acid, phytin, lecithin, carotenoids, tyrosine, salicylic acid, gum copper and trace element zinc [10].

The object of the greatest interest is the pumpkin seed oil [11,12], the main fatty acids of which, accounting for about 90% of the total amount, are oleic, palmitic, stearic and linoleic [13,14].

Pumpkin seed oil also contains ω -3 fatty acids; the latter help prevent atherosclerosis, hypertension and cardiovascular disease, and also stimulate fat metabolism.

In this regard, in the last 10-15 years, most innovative solutions in the field of food production, both in the world and in Uzbekistan, are associated with the use of functional food ingredients based on pumpkin and its processed products.

It is known that the addition of functional food ingredients to traditional food products prevents or compensates for the deficiency of nutrients in the human body and (or) its own microflora. Food ingredients also play an important role in the production of various functional food products, which are regulated by GOST R 52349–2005.

The diet of the population is characterized by excessive consumption of animal fats and easily digestible carbohydrates, and at the same time, for the majority of the population, the diet is significantly deficient in terms of polyunsaturated fatty acids (ω -3, ω -6), soluble and insoluble dietary carbohydrates (pectin, gums, mucus, cellulose, etc.), vitamins (groups B, E, etc.), a wide range of vitamin-like substances of natural origin (L-carnitine, ubiquinone, choline, methylmethioninium, lipoic acid, etc.), macronutrients (calcium, etc.), trace elements (iodine, iron, selenium, zinc, etc.).

As the results of research in the field of functional nutrition show, attention is focused on the need to enrich food products with polyunsaturated fatty acids, micro-and-macro elements, vitamins, and dietary fiber [9,15]. Their deficiency in pudding products can be compensated by the introduction of natural food fortifiers, one of the promising sources of which are pumpkin seeds [9].

Since pumpkin seeds contain a balanced protein and a high content of essential polyunsaturated fatty acids in the oil. Tocopherol (vitamin E), which is part of pumpkin seed oil, is involved in the processes of tissue respiration of cells and oxidation processes [9].

Pumpkin seeds have a positive effect on the formation of technological organoleptic and physico-chemical properties of flour confectionery [1]. In this regard, the study of the chemical composition, including the fatty acid composition of pumpkin oil, is relevant in terms of ingredients for the preparation of functional nutrition.

The purpose of this study was to determine the fatty acid composition of pumpkin seed oil of the Spanish 73 variety by GC-MS.

RESEARCH OBJECTIVE

To study the qualitative and quantitative composition of pumpkin seed oil as one of the functional food ingredients in the composition of innovative formulations of enriched and functional food products.

OBJECT AND METHODS OF RESEARCH

For the study, pumpkin seeds of the Spanish 73 variety were used. Isolation of oil from seeds was carried out by extraction with hexane (chemically pure). For this, pumpkin seeds were crushed using a mill. to a 10 g powdered sample, 50 ml of hexane was poured, then shaken for 2 hours on a Soxhlet apparatus. The extract was isolated by filtration, hexane was distilled off at a temperature of >700 degree Celsius. The remainder of the pumpkin oil was used to study the physico-chemical characteristics and fatty acid composition. Physical and chemical characteristics of pumpkin oil are shown in Table 1.

Table 1. The main physical and chemical parameters of pumpkin seed oil obtained from the seeds of the variety "Spanish 73" by extraction with hexane

N	Name of indicators	Meaning	
		Literary [14]	Found
1	Density at 20°C, g/cm ³	0,91	0,9123±0,0010
2	Refractive index, 20D	1,4595	1,4526±0,0012
3	Saponification number, mg KOH/g	191,3	182,0±14
4	Acid number, mg KOH/g	0,58	0,61±0,06
5	Iodine number	104,8	102,4±8,1
6	The content of unsaponifiable substances, %	5,3	5,2±0,4
7	Content of free fatty acids, %	0,37	0,42±0,03
8	Mass fraction of moisture and volatile substances, %	0,16	0,18±0,02
9	Total content of carotenoids in terms of β-carotene, mg %	9,86	10,23±0,98
10	Total content of tocopherols in terms of α-tocopherols, mg %	132	135±8

From the data in Table. 1 it can be seen that the main physico-chemical characteristics of the oil isolated by us do not significantly differ from the literary ones.

To determine the composition of fatty acids, the oil was isolated according to GOST R 51483–99. Identification and determination of the content of triacyl glycerides was performed by gas-liquid chromatography. The preparation of methyl esters of fatty acids was carried out by the reaction of transesterification with methanol in the presence of acetyl chloride [16]

For the analysis of methyl esters of fatty acids, a Crystal-5000 gas chromatograph with a flame ionization detector was used under the following conditions: a capillary column of 25-m long, with an inner diameter of 0.25, coated with SE-30 of 25-micron in thickness. Moreover, the temperature of column thermostat of -1800C, the evaporator of -2500C, and the flow rate of nitrogen gas carrier of -30 ml/min. Table 2 shows the results of the analysis of the fatty acid composition of pumpkin seed extractive oil.

Table 2. Fatty acid content of pumpkin seed oil of "Spanish 73" variety

Fatty acid	Formula	$x \pm \Delta x$
Myristic acid	C(14:0)	0,248±0,047
Palmitic acid	C(16:0)	19,318±1,718
Palmitoleic acid	C(16:1)	0,225±0,019
Margaric acid	C(17:0)	0,413±0,035
Stearic acid	C(18:0)	6,498±0,408
Oleic acid	C(18:1)	18,107±1,139
Linoleic acid	C(18:2)	54,027±2,729
Linolenic acid	C(18:3)	0,785±0,054
Arachinic acid	C(20:0)	0,232±0,026
Eicosenoic acid	C(20:1)	0,033±0,002
Arachidonic acid	C(20:2)	0,115±0,059
Saturated fatty acids		20,212±1,304
Monosaturated fatty acids		18,365±1,102
Polysaturated fatty acids		54,927±3,246

The amount of unsaturated fatty acids	73,292±3,725
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From the data of Table 2, it can be seen that pumpkin oils of the Spanish 73 variety contain mainly such unsaturated fatty acids as linoleic (54.027 ± 2.729) and oleic (18.107 ± 1.139). The total content of unsaturated fatty acids is 73.292 ± 3.725 of the total content of fatty acids, which is a source of useful fatty acids.

CONCLUSIONS

1. The main physical and chemical parameters of pumpkin seed oil obtained from the seeds of the variety "Spanish 73" by extraction with hexane have been established.
2. It has been ascertained that pumpkin oil "Spanish 73" mainly consists of such unsaturated fatty acids as linoleic (54.027 ± 2.729) and oleic (18.107 ± 1.139). The total content of unsaturated fatty acids is 73.292 ± 3.725 of the total content of fatty acids, which is a source of useful fatty acids.

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