

Fatty Acid Composition Of Almonds

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Abstract— The article presents the results of studies on the study of the content of neutral lipids, glycosides, phospholipids of the nuclei of fruits of the "Dessertny" almond growing in the Namangan region of Uzbekistan. The composition of fatty acids of neutral, glycolipids and phospholipids of the kernels of almond fruit was also studied. It has been established that the main component of almond seed kernels is oleic acid 18: 1ω9, which, according to WHO, has a beneficial effect on the state of the biliary tract and reduces the risk of cardiovascular diseases.

Keywords— almonds, neutral lipids, glycolipids, phospholipids, fatty acids.

1. INTRODUCTION

Uzbekistan occupies a central position among the republics of Central Asia and is a state with a peculiar climate. The most favorable soil and climatic conditions, long growing seasons, an abundance of light and heat make it possible to grow exceptionally high yields of excellent high-quality fruits, including nuts.

In the Republic of Uzbekistan, the main common nut of commercial importance, after the walnut, is almonds. However, the achieved level in this direction does not yet meet the needs of today. Therefore, the Association of Nut Producers and Exporters was established in the republic, which is implementing a program to create modern plantations of highly productive varieties adapted to local natural conditions and climate, including through the widespread introduction of scientific cultivation methods and modern resource-saving technologies.

In the literature, there are data on the successful use of nut kernels of their vegetable oil for the treatment of inflammatory and ulcerative diseases of the stomach, intestines, and therefore the therapeutic effect is associated with the presence of linoleic acid [1,2,3]. They are also ready to remove toxins from the body, stimulate, strengthen such important organs as the heart, kidneys, liver, spleen and gastrointestinal tract [4].

2. MAIN PART

We studied lipids of almond kernels (Rosaceae family), variety "Dessertny" growing in the Namangan region of Uzbekistan.

Lipids were isolated from the preliminarily crushed nuclei of the object under study using a Soxhlet apparatus, first with extraction gasoline - boiling point 72-800C [5] neutral lipids (NL) were extracted and then, after drying the meal, the sum of polar lipids (PL) was extracted with a mixture of chloroform with methanol (2: 1) according to the Folch method [6]. Next, PL was divided into CC into silica gels NL, glycolipids (GL), and phospholipids (PL) with the sequential use of chloroform, acetone, and methanol. Table 1 shows the following lipids in the kernels of almond fruit.

Table 1

Lipid content in the kernels of almond fruit

Indicators	Lipid content,% of core mass
Neutral lipids	56,23
Glycolipids	0,10
Phospholipids	0,47
Acid number of neutral lipids, mg KOH	1,42
The content of unsaponifiable substances in neutral lipids,% of their mass	0,72

From the data in Table 1 it can be seen that in the nuclei of almond kernels, the main lipids are neutral lipids, where the content is 56.23%, i.e. 99% of the total lipid content and corresponds to these indicators given in the literature [7]. There are no data on the yield and use of polar lipids in the literature.

The component composition of groups of neutral, lipids, and phospholipids was established in a thin layer of silicogal using model compounds, qualitative reactions, and chemical transformations [8].

To separate neutral lipids, the solvent systems hexane-ether-acetic acid 7: 3: 0.1 and hexane-ether 1: 1 were used. The spots of the substances were developed in iodine vapor and by spraying the plates with a 50% aqueous solution of H₂SO₄. According to the results of the analysis of neutral lipids in almond seed kernels, they consisted mainly of triglycerides, accompanied by

carbohydrates, free fatty acids and phytosterols. According to the acid number of the oil and the average molecular weight of fatty acids, the content of free fatty acids in oils was calculated [9, p.887] and it was 0.71%. An unsaponifiable substance was isolated from neutral lipids by alkaline hydrolysis [9, p.815], its yield is shown in table 1. According to thin-layer chromatography, using the above solvent systems, phytosterols were the main component of neutral lipids. Phytosterols are biologically active substances, they prevent the development of atherosclerosis, are a semi-finished product for the synthesis of hormones [10], their interaction with phospholipids stabilizes cell membranes and controls their permeability [11].

The composition of glycolipids was determined in a thin-layer chromatograph on silica gel using a solvent system chloroform-acetone-methanol-acetic acid-water 65: 20: 10: 3; the components were developed with α -naphthalene and 50% aqueous solution of H₂SO₄. Stering glycoside was the predominant component of glycolipids.

For the analysis of phospholipids, a system of solvents chloroform-methanol-concentrated ammonia 13: 7: 1 was used, the components of phospholipids were developed with the reagents of Vaskovsky and Dragendorff [8].

Phosphatidylcholine dominated in the composition of phospholipids in almond seed kernels, while the content of phosphatidylinositol was insignificant.

To establish the composition of fatty acids of neutral lipids, glycolipids, and phospholipids, almond kernels were hydrolyzed with an alcoholic alkali solution [12], and the isolated fatty acids were methylated with a freshly prepared diazometer [13]. Fatty acids in the form of methyl esters were analyzed by GC on an Agilent 6890 N instrument with a flame ionization detector, using a capillary column 30m x 0.32 mm with a neutral phase HP-5, carrier gas helium, programming temperature 150-270⁰ C, and on the instrument Chrom-5 also with a flame ionization detector, steel column 2.5m x 4mm, filled with chromton-N-AW with 15% Reoplex-400, column temperature 190⁰ C, nitrogen carrier gas. Fatty acid methyl esters were identified according to [14].

The results of the data obtained are presented in table 2.

Table 2

Composition of neutral fatty acids, glycolipids, phospholipids of almond seed kernels

Fatty acid	% Weight content		
	Neutral lipids	Glycolipids	Phospholipids
14:0	-	4,36	-
16:0	6,52	45,40	27,25
16:1	0,47	-	-
18:2	15,90	12,00	17,76
18:1	75,53	23,35	50,68
18:3	-	-	-
18:0	1,58	14,89	3,76
20:0	-	-	-
20:1	-	-	-
22:0	-	-	0,55
Σ saturated	8,10	64,65	31,56
Σ unsaturated	91,90	35,36	68,44

From the data in Table 2, it can be seen that in the neutral lipids of the almond kernel, the main fatty acids are unsaturated oleic fatty acids (18: 1). There is also a significant content of oleic fatty acids (18: 1) in phospholipids and glycolipids in the nuclei of almond seeds. Palmitic acid (16: 0) predominates in the fatty acid compositions of glycolipids and phospholipids of the almond kernel, and in neutral lipids the content of palmitic acid (16: 0) is significantly lower than in glycolipids and phospholipids. The main unsaturated acid in almond phospholipids remains (18: 1), as in neutral lipids. In the composition of almond glycolipids, stearic acid (18: 0) is 4-6 times more than its content in neutral and phospholipids. In terms of the content of unsaturated linoleic (18: 2) fatty acids, neutral lipids, glycolipids and phospholipids of almond kernel nuclei do not differ within wide limits. In almond phospholipids, unsaturated acids make up a third of the total mass, and in glycolipids, its content is 2/3 of their total mass.

The data of fatty acid composition showed that the main component of almond kernel oil is oleic acid 18: 1 ω 9. According to the WHO, it has a beneficial effect on the condition of the biliary tract and reduces the risk of cardiovascular diseases. Due to the significant content of essential linolenic fatty acids (18: 2 ω 6), almond oil reduces blood clotting in atherosclerosis, and also lowers cholesterol in the human body.

3. CONCLUSION

In this work, the content of neutral lipids, glycolipids and phospholipids of the nuclei of almond fruits growing in the Namangan region of Uzbekistan was investigated.

Almond kernels have a high nutritional and biological value due to their high content of complete protein and non-drying fatty oil. However, there are very few studies in Uzbekistan devoted to the study of lipids and their fatty acid composition.

Studies have established that in the nuclei of almond kernels, the main lipids are neutral lipids, where the content is 56.23%.

It also contains glycolipids-0.10%, phospholipids-0.47%. The study of the fatty acid composition of neutral lipids, glycolipids and phospholipids shows that neutral lipids mainly contain unsaturated oleic fatty acid, palmitic (16: 0) is predominant in glycolipids, and oleic (18: 1) fatty acid is also predominant in phospholipids. acid. Thus, the neutral lipids of the almond kernel are very rich in oleic (18: 1) and linoleic (18: 2) fatty acids. In this regard, almond seed oil can be successfully used in the prevention of a number of diseases.

Conflict of interest

We have no conflict of interest to declare.

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