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Research Article

Study of Lipids and Some Biologically Active Compounds from the Seeds of Apricot Growing in Georgia

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Abstract

The aim of the present paper is to study the seeds of Apricot growing in Georgia (East Georgia, Kakheti Region) for the content of lipids and some biologically active compounds to use them in medicine, pharmacy, perfumery and cosmetology. The sum of neutral (N/L) and Polar lipids (P/L) from Apricot (*Armeniaca vulgaris* Mill) seeds were respectively obtained by using Hexane and chloroform-methanol mixture (2:1) extraction. Saturated, mono- and poly-unsaturated fatty acids were identified in some of the neutral lipids by Gas Chromatography combined with Mass Spectrometry. Were identified following acids: hexadecane (6.09%), hexadecene (1.68%), octadecane (2.25%), 9-octadecene (74.09%), eicosane (0.27%), eicosene (0.66%), tetracosane (0.13%) and hexacosane (0.09%). Hexadecane acid is dominant saturated acid (6.09%) and 9-octadecene acid is dominant unsaturated acid (74%). The sum of polar lipids is 1,46%. The content of carotenoids 4.7 mg%. Were identified 6 amino acids: histidine, asparagine, serine, alanine, valine and phenylalanine. Experimental pharmacological studies suggest, that Apricot (*Armeniaca vulgaris* Mill.) seed oil has a moderately pronounced anti-inflammatory, wound-healing and gastro protective activities.

Keywords: Lipid; Fatty Acid; Phospholipid

Introduction

Lipids are very important biologically active compounds. They are a part of all living cells and biological membranes. They play main role in the vital processes of a living organism and have reserve, protective, energetic and regulatory functions. Lipids have immunotropic, hepatoprotective, antibacterial, antiviral, anti-inflammatory and cytostatic activity; they reduce the risk of atherosclerosis and cardiovascular diseases [1-3].

The goal of the present paper is to study the seeds of Apricot growing in Georgia (East Georgia, Kakheti Region) for the content of lipids and some biologically active compounds to use them in medicine, pharmacy, perfumery and cosmetology [4-6].

Apricot (*Armeniaca vulgaris* Mill., Family: *Rosaceae*) is a tree commonly growing in subtropical countries, on the river banks, in the mountainous areas or rocky slopes. This crop was introduced to the moderate climate zones.

The Apricot fruit contains different biologically active substances: hydrocarbons (27%), potassium salts, organic acids (2,5%), B and C vitamins, carotenoids, folic acid, catechins and flavonoids;

the seeds contain 40% fats, sterins and amygdalin (4%). In medicine, the apricot seed and air-dry fruit are used to treat avitaminosis, anemia, cardiovascular and digestive system diseases. Apricot oil is used in pharmacy, dermatology and cosmetology [7,8].

Material and Methods

Plant material

The seeds of Apricot (*Armeniaca vulgaris Mill*) seeds were collected by hand in autumn of 2018 in Kakheti region, Georgia. They were identified by stuff scientists of Department of Pharmacobotany at TSMU Iovel Kutateladze Institute of Pharmacochemistry.

Extraction of lipids

The sum of neutral lipids (N/L) (yellow substance with oily consistence) was obtained from Apricot (*Armeniaca vulgaris* Mill.) seeds by using four-fold N/Hexane extraction, with 1:5 ratio, at a room temperature, with further thickening with a vacuum-rotatory apparatus at 60^0C. Polar lipids were obtained from the residual plants by extracting with the mixture of chloroform-methanol (2:1).

Separation of neutral lipids by TLC

The neutral lipids were separated using thin layer chromatography (TLC): Mobile phase - petroleum ether-diethyl ether-ice acetic acid (85:14:1), Stationary phase: TLC Silica gel F254 (20 cm × 20 cm, Merck, Darmstadt, Germany), detection with iodine vapor, 1% phosphor molybdenum alcohol solution and 30% sulfuric acid; detection with color reactions and Rf values. The principal classes of the N/L sum were identified: hydrocarbons, triglycerides, fatty acids and sterine.

Methylation procedure

Transesterification reactions were done in 16 × 125 mm glass culture tubes according to a one-step procedure (methanolic HCl for 2 h at 70 °C) as described by Sukhija and Palmquist [13-16].

GS-MS Analysis of the fatty acids methyl ethers

Gas chromatography-mass spectrometry (GC-MS) analysis of the fatty acids was carried out on a GC system (Agilent technologies 7890B). The instrument was equipped with a split/splitless injector. The auto-sampler was attached to HP-5ms Ultra Inhert capillary column (30m×250µm×25µm film thickness) and fitted to Mass Detector (Agilent technologies 5977A MSD). Helium was used as carrier gas with flow rate of 1 mL/min. Injector temperature at 280ºC, and detector temperature at 280ºC. The column temperature was kept at 60ºC for 2 min followed by linear programming from 60 to 100ºC (at 2, 5ºC/min) and kept isothermal for 2 min; 100 to 280ºC (at 7ºC/min) and kept isothermal for 2 min. The transfer line was heated at 280ºC. Mass spectra were acquired in scan mode (70 eV) in range 50-550 m/z. The components of the oil were separated and the chromatogram obtained was identified by comparing the mass spectra to those from National Institute of Standards and Technology (NIST) libraries.

Qualitative analysis of phospholipids

The phospholipids of P/L sum of the seeds of Apricot were determined by using of a thin-layer chromatography: 1. Mobile phase: chloroform-methanol - 25% ammonium (65:30:5). 2. Chloroform-methanol-ice acetic acid-water (170:25:25:6), stationary phase: TLC Silica gel F_{254} (20 cm × 20 cm, Merck, Darmstadt, Germany), was detected by using iodine vapor and Vaskovsky reagent, color reactions, Rf values and tracking substances.

Quantification of phospholipids

The phospholipids in the P/L sum of the seeds of Apricot were quantified by using a spectrophotometric method according inorganic phosphor (Wavelength 620 nm) [9-11].

Amino acid analysis

Separation of Amino acid by TLC In order to determine Amino acids, 80% ethanol extracts of the Apricot seeds were separated by TLC as follows: extracts were applied to the head of a silica gel 60 F254TLC plate (20 cm × 20 cm, E. Merck, Darmstadt, Germany) along with suitable standards. The chromatogram was developed using solvent systems: butanol-acetic acid-water (6:2:2). Bands were visualized with 1% ninhydrin solution [9].

Quantitative analysis of carotenoids

Quantity of total of carotenoids was determined in the sum of neutral lipids by using a spectrophotometric method according inorganic phosphor (Wavelength 451 nm) [12].

Results and Discussion

The content of neutral lipids was obtained from apricot (*Armeniaca vulgaris* Mill.) seeds is 28%. The principal classes of the N/L were identified: hydrocarbons, triglycerides, fatty acids and ster-

ine. Following fatty acids were identified qualitatively and quantitatively by using GC-MS: hexadecanoic acid 6.09%, hexadecenoic acid 1.68%, octadecanoic acid 2.25%, 9-octadecenoic acid 74.09%, eicosanoic acid 0.27%, eicosenoic acid 0.66%, tetracosanoic acid 0.13% and hexacosanoic acid 0.09%. Hexadecanoic acid is dominant saturated acid (6.09%) and 9-octadecenoic acid is dominant unsaturated acid (74%). All the fatty acids were expressed in methyl esters. The major bioactive compounds from oils of apricot (*Armeniaca vulgaris* Mill.) seeds are presented in table 1 and figure 1.

Fatty acids	Molecular formula	Molecular weight (g/mol)	%
Hexadecanoic acid	$C_{16}H_{32}O_2$	256.4	6,09
9-octadecenoic acid	$C_{18}H_{34}O_2$	282.5	74,0

Table 1: Major bioactive compounds from oil of apricot (*Armeniaca vulgaris* Mill.) seeds.

Figure 1: GC-MS Profile of fatty acids from the oil of the seeds of apricot (*Armeniaca vulgaris Mill.).*

The physical-chemical constants of apricot oil were determined table 2.

No	Physical-chemical indicators	Value
1	Density d^{20}	0,910
2	Refractive index n^{20}	1,464
3	Acid value, mg% (KOH)	1,1
4	Iodine value	96

Table 2: Some physical-chemical properties of neutral lipids.

The sum of polar lipids with the output of 1,46% was obtained from the vegetable extraction residue remained following the extraction of neutral lipids. 5 phospholipids (0,11 %) were identified in the sum of polar lipids of apricot seeds: lysophosphatidylcholine, phosphatidylinosite, phosphatidylcholine, phosphatidylethanolamine and N-acylphosphatidylethanolamine.

The content of carotenoid was quantitatively determined in apricot oil (4.7 mg%) and 6 amino acids were identified in apricot seeds: histidine, asparagine, serine, alanine, valine and phenylalanine.

As the pharmacological studies suggest, apricot (*Armeniaca vulgaris* Mill.) seed oil has a moderately anti-inflammatory, wound-healing and gastro-protective activity. Toxicity of the oil is not occured.

Conclusion

The neutral lipids obtained from apricot (*Armeniaca vulgaris* Mill.) seeds contain saturated, mono and poly-non saturated fatty acids. Hexadecanioc acid dominant saturated fatty acid and 9-octadecenioc acid non-saturated fatty acid are major components of neutral lipids. Phospholipids were qualitatively identified in the polar sums of the study object. In the sum of polar lipids were identified: lysophosphatidylcholine, phosphatidylinosite, phosphatidylcholine, phosphatidylethanolamine and N-acylphosphatidylethanolamine. Content of total phospholipids is 0,11%. The content of carotenoids - 4.7 mg%. Were identified 6 amino acids: histidine, asparagine, serine, alanine, valine and phenylalanine. Experimental pharmacological studies suggest, that Apricot (*Armeniaca vulgaris* Mill.) seed oil has a moderately pronounced anti-inflammatory, wound-healing and gastro protective activities.

The oil obtained from the seeds of the apricot is rich in various biologically active compounds what allows developing cheap, but efficient treatment and prophylactic means with the local raw material to practically use in medicine and perfumery.

Bibliography

1. Shipov AN., *et al*. "Vegetable oils and oil extracts". Moscow. Russian doctor (2004): 119.

2. Nikonov GK and Manuilov BM. "Fundamentals of modern pharmacotherapy". Moscow, Medicine, (2005): 107.

3. Kikalishvili B., *et al*. "Study of lipid composition of some plants growing in Georgia. Iovel Kutateladze Institute of Pharmacochemistry of Tbilisi Medical University". *International Academy Journal Web of Scholar* 3.33 (2019).

4. Gagnidze R. "Vascular plants of Georgia, a nomenclatural checkligt". Tbilisi (2005): 96-97.

5. Shantser IA. "Plants of the moderate zone of European Russia". Moscow (2007): 469.

6. Rashid F., *et al*. "Flavonoid glycosides from Prunus armeniaca and the antibacterial activity of a crude extract". *Archives of Pharmacal Research* 30 (2007): 932-937.

7. Guclu K., *et al*. "Antioxidant capacity of fresh, sun- and sulphited-dried Malatya apricot (Prunus armeniaca) assayed by CUPRAC, ABTS/TEAC and folin methods". *International Journal of Food Science and Technology* 41.1 (2006): 76-85.

8. Karapetyan TD., *et al*. "In vitro antimicrobial activity of dried and fresh leaf extracts of old and young apricot trees (Prunus armeniaca)". *The New Armenian Medical Journal* 5.4 (2011): 44-49.

9. Morris Kates. Techniques of Lipidology. Isolation, Analysis and Identification of Lipids. M. (1975).

10. Sponngord RY and Sun M. "Enhancement of an analytical method for the determination oils in viecine adsorbed formualtions". *Journal of Pharmaceutical and Biomedical Analysis* 52 (2008): 554-564.

11. Russian Parmacopeia XIII 1.2.3.0020.15.1.2.4 G method (quantitative determination of phosphorus with an Eiconogenin).

12. ФС. 42-1052-76.

13. British Pharmacopoeia volume V. London: The Stationery Office (2017): 202-203.

14. Darrin L Smith. "Mass Spectrometry Applications in Forensic Science". Encyclopedia of Analytical Chemistry, John Wiley and Sons Ltd, New York City (2010).

15. Sukhija PS and Palmquist D. "Rapid method for determination of total fatty acid content and composition of feedstuffs and feces". *Journal of Agricultural and Food Chemistry* 36 (1988): 1202-1206.

16. Toshimasa T. "Modern Derivatization Methods for Separation Sciences". (Copyright (c) 1999 John Wiley and Sons Ltd, Baffins Lane, Chichester, West Sussex PO19 IUD, England).

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