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PHYSICAL-CHEMICAL CONSTANTS AND FATTY ACID COMPOSITION OF *Zosima absinthifolia* Link. FRUIT OIL

©*Alikhanova N.*, ORCID: 0000-0002-3697-3969, Institute of Botany of Azerbaijan NAS,
Baku, Azerbaijan, elixanovanermin@yahoo.com

©*Novruzov E.*, ORCID: 0000-0003-0436-4891, Dr. habil.,
Institute of Botany of Azerbaijan NAS, Baku, Azerbaijan

ФИЗИКО-ХИМИЧЕСКИЕ СВОЙСТВА И ЖИРНО-КИСЛОТНЫЙ СОСТАВ МАСЛА *Zosima absinthifolia* Link.

©*Алиханова Н. С.*, ORCID: 0000-0002-3697-3969, Институт ботаники НАН Азербайджана,
г. Баку, Азербайджан, elixanovanermin@yahoo.com

©*Новрузов Э. Н.*, ORCID: 0000-0003-0436-4891, д-р биол. наук,
Институт ботаники НАН Азербайджана, г. Баку, Азербайджан

Abstract. *Zosima absinthifolia* is the only species of *Zosima* genus in Azerbaijan. The aim of this study was to determine the quantitative and qualitative determination of fatty acids in the fruits of the plant *Zosima absinthifolia*, which is widespread in Absheron, as well as to study its physicochemical and organoleptic properties, possible use in the pharmaceutical and food industries. The oil obtained from the fruits of the plant collected from the Absheron Peninsula (Bibiheybat) was analyzed by gas chromatography. The oil was obtained at 60 °C for 8 h by the extraction of the fruits in a Soxhlet extractor. The yield was 10.36%. Chromatographic analysis of the oil obtained from plant fruits allowed to determine 14 fatty acids. The main component of *Z. absinthifolia* fruit oil is oleic acid (74.36%). Small amounts of caprylic and palmitic acids were also found to be 8.9% and 5.39%, respectively. The lowest percentage is palmitinoleic acid (0.07%). Physico-chemical constants and organoleptic properties of *Z. absinthifolia* fruit oil were also analyzed and it was determined that the percentage of free fatty acids in our sample was 2.47%, the peroxide value 34.16 mg O/kg and the saponification number 200.23 mg KOH/g.

Аннотация. *Zosima absinthifolia* — единственный вид рода *Zosima* в Азербайджане. Целью исследования было определение количественного и качественного состава жирных кислот в плодах растения *Zosima absinthifolia*, широко распространенного в Апшероне, а также изучение его физико-химических и органолептических свойств. Возможно использование в фармацевтической и пищевой промышленности. Масло, полученное из плодов растения, собранное на Апшеронском полуострове (Бибихейбат), анализировали методом газовой хроматографии. Масло получали при 60 °C в течение 8 ч экстракцией плодов в экстракторе Сокслета. Выход составил 10,36%. Хроматографический анализ масла, полученного из плодов растений, позволил определить 14 жирных кислот. Основным компонентом масла плодов *Z. absinthifolia* является олеиновая кислота (74,36%). Также было обнаружено, что небольшое количество каприловой и пальмитиновой кислот, которые соответственно составляют 8,9% и 5,39%. Самый низкий процент — пальмитолеиновая кислота (0,07%). Также были проанализированы физико-химические константы и органолептические свойства фруктового масла *Z. absinthifolia*, и было определено, что

процентное содержание свободных жирных кислот в нашем образце составляло 2,47%, пероксидное число 34,16 мг О/кг и число омыления 200,23 мг КОН/г.

Keywords: *Zosima*, fatty acids, GLC, physical-chemical constants.

Ключевые слова: *Zosima*, жирные кислоты, ГЖХ, физико-химические константы.

Fatty acids are part of the lipid class and widespread in nature, foods and organisms. Fatty acids, which are an important component of membrane cells, have a variety of biological functions and are also an important source of energy. Their metabolism synthesizes large amounts of adenosine triphosphate (ATP). β -oxidation of fatty acids is a process used by the heart and muscle tissue to obtain energy [1]. One of the most important sources of essential fatty acids can be plant products, especially oils derived from the seeds of various plants found in nature.

Z. absinthifolia has been widely used in folk medicine since ancient times as a traditional medicine in many parts of the world. Fruits, seeds and various aerial parts of the plant are used for medicinal purposes. In Turkish folk medicine, the mixture prepared from the leaves is used to treat diabetes [2, p. 197-266; 3, p. 317-342; 4, p. 179-208]. An extract made from the seeds of *Z. absinthifolia*, a traditional medicinal plant in the Baluchistan region of Pakistan, has an effective effect against coughs and other sore throats [5, p. 361-368] and for the treatment of gastrointestinal diseases [6, p. 1-84; 7, p. 10892-10901]. The plant has such beneficial therapeutic properties due to its biologically active substances, fatty acids, sterols, alcohols, phenolic acids, etc., which are part of its lipid components. may be due to availability.

The purpose of this study was to determine the quantitative and qualitative determination of fatty acids in the oil obtained from the fruits of the plant *Zosima absinthifolia*, which is widespread in Absheron, as well as to study its physicochemical and organoleptic properties, possible use in the pharmaceutical and food industries.

Material and methods

Plant material was collected in May 2021 from the Absheron Peninsula (Bibiheybat). Dried fruits (61 g) were ground with an electric grinder (mrc-FAM-100). The fruits oil was extracted in Soxlet apparatus using n-hexane as solvent. The extract was evaporated using a rotary evaporator (mrc-ROVA-N2L). The amount of fat was determined by the accepted method [8]. The content of fatty acids was determined in accordance with GOST 31665-2012. The obtained oil was esterified to determine fatty acid composition. Quantitative and qualitative composition of metal esters of fatty acids was determined on the HP 6890 series chromatograph with an ionization detector. A 100-meter Agilent 112-88A7 capillary column was used for separation. The temperature regime of the column is programmed as follows: initial temperature 140°C - constant for 5 minutes, temperature rise from 4°C min to 240°C is stable for 15 minutes. The analysis time is 45 minutes. The carrier gas is hydrogen.

Results and discussion

It was found that the fruits of *Z. absinthifolia* contain 10.36% fat. Chromatographic analysis of the oil shows that it contains 14 fatty acids - caproic, caprylic, capric, lauric, myristic, myristoleic, palmitic, palmitoleic, stearic, oleic, linolenic, linoleic, arachidic and behenic. The quantitative and qualitative composition of fatty acids is given in Table 1. As can be seen from the table, the highest percentage of fatty acids is oleic acid (74.36%), followed by caprylic acid (8.9%)

and palmitic acid (5.39%). Small amounts of stearic acid were found. The content of this fatty acid was 1.63%, respectively. The smallest amounts are myristoleic (0.15%) and palmitoleic acid (0.03%).

Table 1

FATTY ACID COMPOSITION OF *Z. ABSINTHIFOLIA* FRUIT OIL

Fatty acids	% of total	RT, (min)
C6:0	0.17	9.333
C8:0	8.9	10.637
C10:0	0.33	12.746
C12:0	0.66	15.615
C14:0	0.80	18.889
C14:1	0.15	19.815
C16:0	5.39	22.253
C16:1	0.07	23.097
C18:0	1.63	25.662
C18:1	74.36	26.550
C18:2	0.50	27.425
C18:3	0.33	29.358
C20:0	0.23	28.432
C22:0	0.44	31.755

Note: RT — retention time

During the previous studies, 1.2% capric acid was found in *Z. absinthifolia* fruits in Azerbaijan [9, p. 167-173; 10, p. 137-165]. Only caprylic and palmitic acid have been identified in the *Z. absinthifolia* plant in Iran. Their content was 1.69 and 0.15% in the leaf, respectively, and 3.47 and 0.52% in the initial stage of seed development [11, p. 1556-1567]. S.Karakaya and his colleagues identified the fatty acid of caprylic (0.1%), lauric (0.2%) and myristic (1.0), the aerial parts (4.1%), the root (1.3%) and the palmitic acid in the flowers (12%) [12, p. 722]. The aerial parts of the plant were detected 0.8% palmitic acid [13, p. 114-116] and 1.3% capric acid [14, p. 490-493]. In comparison with world literature data fatty acid components composition of fruit oil of *Z. absinthifolia* is rich which is growing in Absheron peninsula. Caproic, myristoleic, palmitoleic, steric, oleic, linolenic, linoleic, arachidic and behenic acids were first identified for the plant *Z. absinthifolia*.

Based on the results of research on the quantitative and qualitative composition of various groups of compounds in plants, it is fully confirmed that the qualitative composition of one or another group of substances in plants is a genetic trait acquired by the plant in its natural historical development. These factors can only affect their quantity. Therefore, we believe that this difference is related to the research method of previous studies.

Unsaturated fatty acids are in the spotlight as one of the common defense systems against various biotic and abiotic stresses [15, p. 1771]. The highest percentage of fatty acids in the oil component of *Z. absinthifolia* fruits was oleic acid. Oleic acid is a monounsaturated fatty acid found naturally in many plants, slows the development of heart disease and synthesizes antioxidants [16, p. 385-398]. Oleic acid is widely used in the treatment of brain disease with adrenomyeloneuropathy [17, p. 745-752]. One of the main sources of oleic acid in foods is olive oil. Thus, oleic acid is a major component of many vegetable oils, including olive and some oils [18, p. 710-732]. Oleic acid also has antioxidant activity [19, p. 431-433].

It was found that the oil obtained from *Z. absinthifolia* fruits has potential antibacterial and antifungal properties of identified fatty acids - lauric, palmitic, linoleic, oleic, stearic and myristic [20, p. 613-619; 21].

The physicochemical constants and organoleptic properties of the oil obtained from *Z. absinthifolia* fruits were studied and the results are shown in Tabel 2. In our sample, the percentage of free fatty acids associated with fat hydrolysis was 2.47%, the peroxide value was 34.16 mg/kg, the saponification number was 200.23 mg KOH/g, and the iodine number was 66.02 IV.

Table 2

PHYSICO-CHEMICAL CONSTANTS AND ORGANOLEPTIC PROPERTIES OF *Z. ABSINTHIFOLIA*

<i>Experiment</i>	<i>Test method</i>	<i>Result</i>
Organoleptic parameters	GOST 5472-50	
appearance		opaque, weakly blurred
colour		green
taste		bitter taste
Free fatty acids,%	ISO 660:2009	2.47
Peroxide value, mmol O ₂ / kg	ISO 3960:2017	34.16
Iodine value, IV	AOCS Cd 1c-85	66.02
Saponification value, KOH	ISO 3657	200.23
Mass fraction of phosphorus-containing substances, mg/kg	GOST P 52676-2006	426.9

Physico-chemical characteristics of the oil obtained from the fruits of *Z. absinthifolia*, the quantity and quality of the fatty acid content show that it can be used in the preparation of edible oils, medicines, and cosmetics.

Conclusion

It was determined that *Z. absinthifolia*, which grows in Absheron, contains 10.36% fat. The oil was found to contain 14 fatty acids. 17.88% of fatty acids are saturated and 75.93% are unsaturated fatty acids. The fatty acids, kapron, myricitinolein, palmitinolein, sterin, olein, linolenic, linoleic, arachidic and behenic acids were first identified for *Z. absinthifolia*. To summarize, this study can provide valuable information about *Z. absinthifolia* fruit oil can be used for medicine and food industry fields.

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