Fatty-acid composition of *Olea europaea* (L.) and *Perilla frutescens* (L.) Britton. oils in the conditions of the Southern Coast of the Crimea

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Abstract. The fatty acid composition of the oil from the fruits of various olive cultivars (Olea europaea) and seeds of the spicy-aromatic culture Perilla frutescens, growing in the conditions of the Southern Coast of the Crimea, has been specified. cv.′Nikitskaya′ is characterized by a high content of monounsaturated (49.5–66.2% oleic acid) and polyunsaturated fatty acids (3.3–10.7% linoleic and 0.2–0.4% linolenic), as well as a low content of saturated acids (10.43% in green and 8.04% in ripe fruits). Perilla seed oil is a rich source of essential polyunsaturated fatty acids: 52.77% linolenic and 10.88% linoleic with an oil content of 34.54% seeds. Perilla oil has the lowest ratio of saturated fatty acids to total (7.42%), while olive oil exhibits the highest ratio of monounsaturated acids (75.68%). Thus, different oilseed crops have unique nutritional features, which means that it is necessary to choose depending on the specific purposes of use.

1 Introduction

Fats are essential nutrients for humans, playing a fundamental role in a balanced diet. They are the most energy-dense component of food, providing significant energy reserves. Not only are fats vital for building energy reserves, they are also essential for providing essential fatty acids, which are the building blocks of important hormones and prostaglandins. In addition, fats play an important role in facilitating the absorption of fat-soluble vitamins [1]. Lipid metabolism is essential for cellular function, as it generates a number of bioactive molecules that act as key mediators in various signaling pathways. These molecules, such as phospholipids, steroids, prostaglandins and leukotrienes, can have a variety of biological effects, including regulation of inflammation, cell growth, apoptosis and other important processes. This highlights the indispensable role of fats in maintaining cellular health and regulating metabolic processes.

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Fatty acids (FA) play a fundamental role in lipid metabolism and have a complex structural classification. Saturated fatty acids (SFAs) do not have double bonds between carbon atoms, making them chemically stable and usually solid at room temperature. Their primary role in the diet is less significant compared to unsaturated fatty acids, which provide significant benefits for cardiovascular health and overall cellular function. Unsaturated fatty acids are divided into monounsaturated fatty acids (MUFAs) and polyunsaturated fatty acids (PUFAs).

MUFAs contain one double bond, which gives them greater flexibility and fluidity in their structure compared to SFAs. This flexibility is useful for various biological processes. On the other hand, PUFAs have two to six double bonds, which further increases their flexibility and involvement in complex biological functions. They are also known as vitamin F due to their important role in health [2].

The spatial arrangement of hydrogen atoms around the double bond, depending on whether the bond is in a cis or trans configuration, affects the physical properties of the fatty acid and biological functions. PUFAs are further classified based on the position of the first double bond from the methyl end of the molecule, known as n-3 (omega-3) or n-6 (omega-6). The human body cannot produce PUFAs with the first double bond at the C3 and C6 carbon positions from the methyl end because it lacks the necessary enzymes to synthesize them [3]. The primary representatives of omega-6 and omega-3 fatty acids found in vegetable oils are linoleic acid (C18:2) and alpha-linolenic acid (C18:3), respectively. These essential fatty acids are crucial for human health and must be obtained through the diet. Consequently, products rich in these fatty acids are particularly valuable for their nutritional benefits [4]. In addition, polyunsaturated fatty acids (PUFA) participate in the formation of eicosanoids, which are precursors of prostaglandins and leukotrienes. These substances play a decisive role in the development of atherosclerosis, have cardioprotective and antiarrhythmic effects, regulate inflammatory processes and help reduce cholesterol levels and other important health indicators. A deficiency of PUFA can disrupt hormonal function.

In recent years, essential fatty acids have come to be considered food products and nutraceuticals. Numerous studies have confirmed their role in various biochemical processes, which provides a cardioprotective effect due to their pronounced antiatherogenic, antithrombotic, anti-inflammatory, antiarrhythmic and hypolipidemic properties. These acids can reduce the risk of serious diseases such as cardiovascular diseases, cancer, osteoporosis and diabetes. Their combined effects on lipoprotein levels, membrane fluidity, membrane enzyme and receptor function, as well as eicosanoid modulation, blood pressure and mineral metabolism, contribute to the maintenance of overall health. [5-12].

The daily requirement of the body for omega-6 is individual for each person and is in the range of 4.5 – 8 grams (5 – 8% of the total caloric content of the diet), and omega-3 is 1 gram [13]. The main sources of omega-6 are vegetable oils.

Monounsaturated fatty acids (MUFA) play an important role in maintaining human health, although they are not essential, as they can be synthesized in the body from saturated fatty acids and partly from carbohydrates. These fatty acids contribute to the optimal functioning of cell membranes, which facilitates the introduction of polyunsaturated fatty acids (PUFA) into cells.

The main MUFAs include myristoleic and palmitoleic acids (omega-7) and oleic acid (omega-9). Myristoleic acid, although found in small amounts in the diet, plays a role in maintaining membrane flexibility and modulating lipid metabolism. Palmitoleic acid, found in foods such as avocado and olive oil, helps improve metabolic processes and may have an anti-inflammatory effect. Oleic acid, most abundant in olive oil and other plant sources,

helps maintain the integrity and functionality of cell membranes and helps regulate cholesterol levels.

Thus, although MUFAs are not essential to obtain from food, their presence in the diet and their synthesis in the body are key to maintaining cellular health and overall metabolic balance.) [14-15].

Vegetable oils are concentrated sources of energy and essential building elements, which are contained in seeds and various parts of plants. At the moment, the main sources of vegetable oils are the fruits and seeds of oil crops, which contain from 20% to 60% fat. These include sunflower, castor, sesame, saffron oils, as well as oils extracted from the pulp of olives and some types of palm trees. These oils not only provide the body with important fatty acids, but also play a significant role in various industrial and food industries [16].

In connection with the above, research is relevant to determine the mass fraction of fatty oil and its fatty-acid profile contained in oilseed crops of the NBG-NSC collections. The chosen research direction and its results will further determine the optimal processing method for certain crops and their cultivars, as well as obtaining high-quality raw materials from them for the pharmaceutical, cosmetic and food industries with further standardization within the framework of import substitution.

In order to expand the range of sources of fatty oils and search for essential PUFA, the composition of fatty oils (MUFA, PUFA and SFA) in the fruits of five cultivars of *Olea europaea* (L.) of the NBG's breeding (′Nikitskaya′, ′Tlemcen′, ′Tolgomskaya′, ′Lomashenskaya′, ′Coregiolo′) and in seeds aromatic culture of *Perilla frutescens* (L.) Britton.

2 Objects and methods of research

The object of the study was the fruits of olives of 5 cultivars, different in terms of maturation and nature of use, both bred by the Nikitsky Botanical Gardens and introduced, growing at the same production site of the NBG, geographically located on the Southern Coast of the Crimea in the area of Nikita village. *Olea europaea* cv. ′Nichitskaya′ was isolated from olive plantations growing on the territory of the NBG, and is characterized by an early ripening period, in which the mass harvest of fruits occurs at the end of October. cv. ′Tolgomskaya′ of Caucasian origin and cv. ′Tlemsen′ (D'elemsen) of the Mediterranean origin ripen in an average time, and mass harvesting of fruits is carried out in the first half of November. cv.′Lomashenskaya′ is also of Caucasian origin, characterized by an average late ripening period with a mass harvest of fruits in the second half of November [17-19].

The fruits were harvested in mid-autumn, when they become hard and change color from green to yellowish-green. According to the method of canning green olives, the same Spanish method of "pickles", processed fruits of the olive tree cultivars: ′Nikitskaya′, ′Tlemcen′, ′Tolgomskaya′, ′Lomashenskaya′; by the method of dry salting – cv. ′Coregiolo′ [20]. Fruit samples were collected manually between October and November 2021. The finished products were received in 2022.

To analyze the fatty-acid composition of oils obtained from *Perilla frutescens* seeds, the object of the study was seeds with a growing area of the Republic of the Crimea.

The determination of fatty oil was carried out in accordance with GOST R 54607.5-2015 "Catering services. Methods of laboratory control of public catering products. Part 5. Methods for determining fat" − determination of the mass fraction of fat by fat-free residue (the main method). The profile of fatty acids was determined using gas chromatography, expressing the results as a percentage representing the relative areas of their respective methyl esters, according to the method specified in GOST 31663-2012 "Vegetable oils and animal fats. Determination by gas chromatography of the mass fraction of methyl esters of fatty acids" and according to GOST 30623-2018 "Vegetable oils and products with a mixed

composition of the fatty phase. The method of detecting falsification." Fatty acids were identified by comparing their retention time with the retention time of standard reference compounds. In our studies, the identification of the fatty-acid composition of the oil was carried out using the standard Food Industry FAME Mix 35077.

All indicators were compared with the maximum permissible according to technical specifications, GOST standards and technical regulations of the Customs Union. Biochemical studies of the samples were carried out on the equipment of the CCU "Physiological and Biochemical Studies of plant objects" of the Federal State Funded Institution of Science "The NBG-NSC" (Yalta, Russia), the Department of Processing and Standardization of Essential Oil Raw Materials and the Laboratory of Agrochemical Research of the Federal State Funded Institution of Science "SRCA of Crimea" (Simferopol, Russia).

3 Results and Discussion

An assessment of the mass fraction of crude fat (Fig. 1) contained in the studied samples showed that among the studied oilseed crops growing in the conditions of the Southern Coast of the Crimea, *Perilla frutescens* has the highest content (37.47%). It was found that the oil content (the mass fraction of fatty oil in 100 g of freshly harvested seeds) of the studied perilla samples ranges from 34.54% to 37.86% by crude weight and from 34.87% to 40.31% per a.s.m.

Among the olive cultivars, the oiliest cultivar is cv. 'Nikitskaya', with a lipid concentration of 26.4%, although its collection was carried out in an immature stage. In the course of research, it was found that the processing of green fruits by the method of canning in brine provides an increase in the concentration of lipids per absolutely dry mass only in the fruits of the olives of cv. 'Tlemcen' - by 2.02 percentage points, in the rest their level decreases from 3.86 to 11.57 percentage points, but at the same time leading in terms of the mass fraction of crude fat in fruits after the processing remains the same grade of olives - 14.82 %. Processing of ripe olives of cv.'Coregiolo' by the dry salting method contributed to an increase in the mass fraction of crude fat by 13.8 percentage points (34.6%).

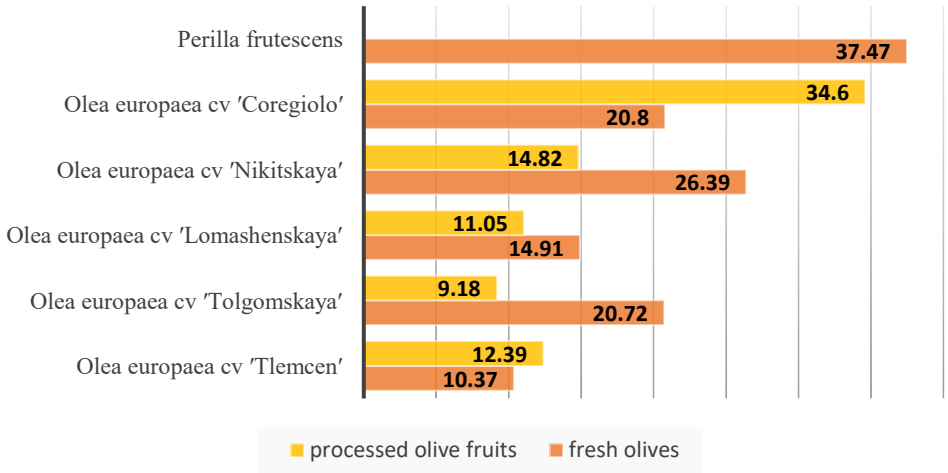

Fig. 1 Mass fraction of crude fat in oilseed crops, % per absolutely dry mass

The fatty-acid composition of the essential oil contained in the olive fruits of the studied cultivars is shown in Table 1.

It was found that in the mesocarp of the fruits of *O. europaea*, both in fresh and processed, monounsaturated fatty acids (MUFA) make up the majority of the lipid fraction [21].

In general, monounsaturated fatty acids (MUFA) are primarily represented by oleic acid (18:1, omega-9). During processing, the concentration of oleic acid tends to increase, which leads to an average increase of 18.44 percentage points for five varieties. Among them, the highest content of oleic acid in fresh fruits was observed in the cv.′Nikitskaya′ - 66.17%, while its highest concentration (75.02%) in processed fruits was found in the cv.′Lomashenskaya′. In addition, palmitoleic acid (16:1, omega-7) is present in MUFA, although in smaller quantities. In fresh fruits, its concentration fluctuates from 0.4% to 1.2%, and during processing it decreases from 0.02 to 0.46 percentage points.

PUFAs are mainly represented C18:2 (linoleic acid – omega-6) in fresh fruits in a volume of 3.3 to 10.7%, and C18:3 (linolenic acid – omega-3) – from 0.2 to 0.4%. In the process of processing by canning in brine, the concentration of PUFA decreases from 4.89 to 0.63 pp., in the fruits of cv.′Lomashenskaya′, there is a tendency to increase them by 5.17 pp. The highest concentration of PUFA after processing was found in the fruits of cv. ′Coregiolo′ processed by dry salting and its level was 10.85 %, which is 7.42 pp. more than in fresh fruits of this cultivar.

Saturated fatty acids (SFAs) were represented by myristic acid (C14:0), palmitic acid (C16:0), margaric acid (C17:0), and stearic acid (C18:0). Among these, myristic acid (C14:0) was detected in trace amounts exclusively in olive oil, where it constituted 0.01%. Notably, myristic acid was absent in table olives.

Table 1. Fatty-acid composition of the fatty oil contained in the fruits of olives of the "NBG-NSC"

Name of the fatty acid (FA)	Code of FA	GOST 30623	Method of preservation in brine												Dry salting method			Olive Oil Extra Virgin [22]
			'Tlemcen'			'Tolgomskaya'			'Lomashenskaya'			'Nikitskaya'			'Coregiolo'			
			fresh	processed	±, p.p.	fresh	processed	±, p.p.	fresh	processed	±, p.p.	fresh	processed	±, p.p.	fresh	processed	±, p.p.	
			Mass fraction, %															
Saturated fatty acids (SFA)			**7,65**	**4,79**	**-2,86**	**10,58**	**6,94**	**-3,64**	**9,64**	**12,47**	**2,83**	**13,84**	**14,51**	**0,67**	**8,04**	**12,8**	**4,76**	**16,14**
myristic	$C_{14:0}$	до 0,05	0,1	x	-0,1	0,2	x	-0,2	x	x	x	x	x	x	0,03	x	-0,03	0,02
palmitic	$C_{16:0}$	7,5-20,0	6	3,34	-2,66	8,52	5,46	-3,06	7,25	10,01	2,76	11,15	11,38	0,23	7,22	12,22	5	11,54

linolenic	linoleic	**Polyunsaturated FA (PUFA)**	oleinic	palmitoleic	**Monounsaturated FA (MUFA)**	stearic	margaric (heptadecanoic)
$C_{18:3}$ (ω3)	$C_{18:2}$ (ω6)		$C_{18:1}$ (ω9)	$C_{16:1}$ (ω7)		$C_{18:0}$	$C_{17:0}$
до 1,5	3,5-21,0		55,0-83,0	0,3-3,5		0,5-5,0	до 0,3
0,39	7,4	**7,79**	49,48	0,35	**49,83**	1,49	0,06
0,44	6,24	**6,68**	66,93	0,46	**67,39**	1,45	x
0,05	-1,16	**-1,11**	17,45	0,11	**17,56**	-0,04	-0,06
0,32	6,7	**7,02**	50,8	0,43	**51,23**	1,78	0,08
0,66	5,73	**6,39**	72,62	x	**72,62**	1,48	x
0,34	-0,97	**-0,63**	21,82	-0,43	**21,39**	-0,3	-0,08
0,16	3,28	**3,44**	50,87	0,75	**51,62**	2,23	0,16
0,18	8,43	**8,61**	75,02	0,55	**75,57**	2,35	0,11
0,02	5,15	**5,17**	24,15	-0,2	**23,95**	0,12	-0,05
0,44	10,65	**11,09**	66,17	0,64	**66,81**	2,69	x
0,39	5,81	**6,2**	72,76	0,62	**73,38**	3,13	x
-0,05	-4,84	**-4,89**	6,59	-0,02	**6,57**	0,44	x
0,18	3,25	**3,43**	45,99	1,16	**47,15**	0,61	0,18
0,418	10,43	**10,85**	68,19	0,7	**68,89**	0,49	0,09
0,238	7,18	**7,42**	22,2	-0,46	**21,74**	-0,12	-0,09
0,81	7,02	**7,83**	73,33	0,91	**75,68**	3,40	0,12

Also, C17:0 was found only in the fruits of olives of cv. ′Lomashenskaya′ and cv.′Coregiolo′ – 0.11 and 0.09 %, respectively, but its concentration was within the permissible limits of GOST 30623-2018, its presence was not detected in other samples. The lowest content of SFA was contained in canned olives of cv.′Tlemcen′ and their combined mass fraction was 4.79 %.

The average content of saturated fatty acids (SFAs) in immature fruits post-canning was found to be 9.68%, reflecting a reduction of 0.75 percentage points compared to their levels in freshly harvested fruits. Conversely, in ripe varieties subjected to dry salting, the SFA content increased significantly by 4.76 percentage points, reaching 12.8%. This variation highlights the impact of different processing methods on the SFA concentration in fruits.

Based on the scientific research conducted in 2022, which examined the physicochemical properties of olive fruits from various cultivars under agricultural complex conditions, both in their fresh state and after processing using the "NBG-NSC" methods, it was found that the cultivars ′Tolgomskaya′ and ′Nikitskaya′ exhibited superior characteristics. These cultivars were distinguished by their high proportion of crude fat content after processing through canning green fruits, and they also demonstrated a favorable fatty-acid composition for consumption as table olives.

All parts of the *Perilla frutescens* plant, except the root, are raw materials for the production of oils of various kinds. The source of essential oil is the aboveground part (shoots and leaves), and mature seeds are used to obtain fatty oil [23, 24]. The degree of roasting of seeds determines the scope of further use of fatty oil, from food to industrial. There are food and technical directions for the use of fatty perilla oil. Technical oil is

obtained from unroasted seeds [25]. It has been established that edible fatty oil is a source of essential polyunsaturated and saturated acids. Perilla oil is obtained from pressed roasted seeds by cold pressing or CO_2 extraction. Technical, quick-drying culture oil, compared with other vegetable oils, has the highest iodine number 181-206, acid number 0.6-3.9 and saponification number 189-197, this unique property is used in the paint industry, due to its highly insulating properties it is added to printing ink, drying oil, varnish, impregnated fabrics, giving them water-repellent properties. Edible perilla oil is transparent, golden yellow in color and has a nutty taste with a typical spicy-peppery smell [26]. It is used as a dietary product in a rational diet. The fatty acid composition is almost identical to flaxseed, it contains rosemary acid, luteolin, chrysoeriol, quercetin, catechin, apigenin, in addition, the oil contains antioxidants – derivatives of oxazolidinedione and hydroxyphenylactamide [27]; contains α – linoleic acid (C18:3 ω3 in the range of 54-65% maximum values of 64.19% and 59.08%); oleic acid C18:1 ω9 (13-21%); linoleic acid C18:2 ω6 (14-21%, isolated experiments 12.79% and 14.79%); palmitic acid C16:0 (5,95-7,38%); stearic acid C18:0 (1,85-1,93%); glucolipids 4-6% ; phospholipids 2-3%; polyphenol (mostly rosemary acid) at 80.56+/-1.79mcg/g; vitamin E at 641.15+/-17.36mcg/g, which is expressed by γ-topocherol at 89% [28].

Traditionally, the main regions of perilla cultivation are the countries of Southeast Asia. Analyzing the fatty acid composition of various growing sites (Table. 2), it is possible to judge the quality of the perilla oil obtained in the conditions of the SCC.

The fatty oil obtained from the seeds of *Perilla frutescens*, which grows in the climatic conditions of the South Caucasus, is a source of essential PUFAs: linolenic – 52.77% and linoleic – 10.88%, MUFA - oleic – 14.04%. SFAs are palmitic – 5.46%, palmitoleic – 0.56%, margarine – 0.36%, stearic – 1.60%.

A comparison of the fatty-acid composition of the oil obtained at the NBG-NSC with analogues from Southeast Asian countries showed that the oil composition of samples introduced in the Crimea is as similar as possible to the oil of samples from China, thereby confirming the fact of the Chinese origin of the seeds.

Table 2. Fatty-acid composition of *Perilla frutescens* fatty oil

Name of FA	Code of FA	The mass fraction of fatty acids (% of the total fatty acids) in the oil						
		GOST 30623-2018 (hemp)	Growing regions [25]					
			India	China	Japan	Korea	Thailand	Republic of the Crimea, SCC
Saturated fatty acids (SFA)			**12,2**	**10,1**	**11,5**	**11**	**7,5**	**7,42**
palmitic	C 16:0	3,6-7,2%	9,9	7,2	7,7	7,4	6,9	5,46
margaric	C 17:0	<0,3%	x	x	x	x	x	0,36
stearic	C 18:0	1,0 – 3,0%	2,3	2,9	**3,8**	**3,6**	0,6	**1,60**
MonounsaturatedFA (MUFA)			**0,1**	**20,8**	**10,2**	**9,5**	**10,5**	**14,6**
palmitoleic	C16:1 (ω7)	до 0,2%	x	x	x	x	x	0,56
oleinic	C18:1 (ω9)	11-18%	0,1	**20,8**	10,2	9,5	10,5	**14,04**
Polyunsaturated FA (PUFA)			**83,1**	**63,1**	**78,3**	**79,5**	**82,0**	**63,65**
linoleic	C18:2 (ω6)	12 – 20%	14,5	10,5	17,9	16,5	**20,8**	**10,88**
linolenic	C18:3 (ω3)	48,5-68,5	**68,6**	**52,6**	**60,4**	**63,0**	**61,2**	**52,77**

Based on the data provided, the crude fat content in perilla seeds was measured at 34.54% by raw weight and 36.98% by absolutely dry weight. This is in line with existing literature, where lipid content in perilla seeds typically ranges from 35% to 45%.

Specifically, 100 grams of perilla seeds contain 0.345 grams of fat by raw weight and 0.369 grams by absolutely dry weight. Additionally, the moisture content of the seeds is 6.6%.

An assessment of the essential polyunsaturated fatty acids, including omega-3 and omega-6, in oilseeds cultivated in the NBG-NSC region under the climatic conditions of the Southern Coast of Crimea is detailed in Table 3. This analysis highlights the concentration levels of these crucial fatty acids in the studied samples.

Table 3. Fatty-acid profile of fatty oils of *Perilla frutescens* and *Olea europaea*

Name of FA	Code of FA	Mass fraction of fatty acids (% of the total fatty acids)			
		Perilla frutescens	*Olea europaea*		
			unrefined olive oil	fruits (cv 'Nikitskaya')	
				fresh	processed
Saturated fatty acids (SFA)		**7,42**	**16,14**	**13,84**	**14,51**
palmitic	C14:0	x	0,02	x	x
margaric	C16:0	5,46	11,54	11,15	11,38
stearic	C17:0	0,36	0,12	x	x
MonounsaturatedFA (MUFA	C18:0	1,60	3,40	2,69	3,13
palmitoleic		**14,6**	**75,68**	**66,81**	**73,38**
oleinic	C16:1 (ω7)	0,56	0,91	0,64	0,62
Saturated fatty acids (SFA)	C18:1 (ω9)	14,04	73,33	66,17	72,76
Polyunsaturated FA (PUFA)		**63,65**	**7,83**	**11,09**	**6,2**
linoleic	C18:2 (ω6)	10,88	7,02	10,65	5,81
linolenic	C18:3 (ω3)	52,77	0,81	0,44	0,39

According to the content of linolenic acid C18:3 ω3, the oil from mature seeds of *Perilla frutescens* was identified as the leader, in which its level was 52.8%, which exceeds the same indicator in olive samples by 51.9 – 52.4 pp. Also this oil is the best in terms of concentration of the total amount of PUFAs – 63.7%, and exceeds olive oil has a similar indicator by 55.8 percentage points (Flax oil: oleic – 13-29, linoleic – 15-30, linolenic – 44).

The oil contained in *Olea europaea* fruit processing products, in comparison with other studied samples, is the leader in the content of oleic fatty acid C18:1 ω9 – 75.7%, which is 61.1 percentage points higher than similar indicators for perilla. Oleic acid belongs to the group of MUFA and is a representative of omega-9.

The studied oils are sources of unsaturated fatty acids with high levels of linoleic acid – *Perilla frutescens*, oleic – *Olea europaea* oil.

4 Conclusion

As a result of the conducted research, it was found that the olives of Olea *europaea,* especially 'Nikitskaya', have a high content of monounsaturated (49.5–66.2% oleic acid) and polyunsaturated fatty acids (3.3–10.7% linoleic and 0.2–0.4% linolenic). The relatively low content of saturated fatty acids (10.43% in green and 8.04% in ripe fruits) confirms their nutritional value.

Perilla frutescens fatty oil is a significant source of essential polyunsaturated fatty acids, including 52.77% linolenic acid and 10.88% linoleic acid, in addition to 14.04% oleic acid. The oil content of the seeds is 34.54%, which makes them a valuable product for the production of oils.

Based on the data analysis, the fatty acid composition of the oils studied differs significantly. Perilla oil (Perilla frutescens) is distinguished by its high content of polyunsaturated fatty acids, especially linolenic acid (C18:3 ω3), which makes up 52.77% of the total fatty acid content. This oil also has the lowest ratio of saturated fatty acids to total fatty acids, equal to 7.42%. In contrast, olive oil (Olea europaea) stands out for its high content of monounsaturated fatty acids (75.68%), in particular oleic acid (C18:1 ω9), which makes up 73.33% of its composition. These differences highlight the unique nutritional characteristics of each oil, with perilla oil being a source of omega-3 and olive oil a source of omega-9, while both oils are equivalent sources of omega-6.

In general, each type of oil under study has its own unique features and advantages, and the choice of the best one depends on the specific needs and purposes of its use.

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