Wild almond (amygdalus nana l.) Oil physical and chemical indicators, fatty acids and the study of element components

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Abstract. The wild almond (Amygdalus nana L.) seeds from the Nurota district in the Navoi region of the mountains have been used, and the extraction of the seed oil was established using the cold-pressing method. The main physical-chemical indicators of the oil were defined. The composition of the oil, including the induction of the oil and argon plasma emissions, as well as the fatty acid components, were studied using chromatographic and spectrometric methods, and elemental analysis was carried out. The macroelements (Ca, Na, Al, P, K) and micronutrients (Fe, Cu, Zn, Se, Mn, Co, Ni) present in the oil composition were determined. Additionally, a microbiological purity assessment and a quantitative analysis of the heavy metals present in the oil content were conducted.

1 Introduction

In the countries of Central Asia with a number of bitter almonds, wild almond (Amygdalus neithernor L.) is common. These plants' height reach 1.5 m. They could grow well in any places; even there is less water in the soil. They have very beautiful pink colored flowers, especially during the flowering period. Bushleaks to the underside of the leaves, but the upper part of the green. Wild almonds have a lot of fruit, which is covered with short fur, and its shape is small oval. The fruits, mainly blooming in April, may and September are ripening [1]. The almond fruit is very bitter, for this reason they are not bought for consumption. However, its oil is being used in folk medicine and for many purposes. The oils are yellowish with a distinct odor. Wild almond kernels store the Cyanogen glycoside amygdalin in their composition. Therefore, it is also not consumed. If a large amount of wild almonds is eaten it can reach the blood and cause hypoxia, which lacks oxygen.

On the basis of bitter almonds, its alcoholic extract was obtained, which was found to contain a high-performance liquid chromatography (HPLCH) method of amygdalin in an amount of 27.2 %. Since aqueous extract is easily hydrolyzed, it has been shown to contain

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very little amygdalin [2]. When amygdalin was exposed to n-ferrosenylbenzoynoic acid, a new derivative of it was obtained [3]. With the hydrodistillation method with 0.7 %, benzaldehyde (62.52 %), benzoic acid (14.80 %) and hexadecan (3.97 %) were isolated from the curried bitter almond seeds powder by the HPLCH method. The resulting products showed very good fungicidal properties. Bitter almond essential oils have had an effective effect against Gloeosporium orbiclee fungi [4]. The oil contains macro-and microelements important in its composition, indicating that it has antimicrobial and antioxidant properties [5-8].

In all parts of the tree of bitter almonds (branches, shoots, roots and seeds of unripe fruits) there is mainly the substance monoglycoside prunazine, and the substance amygdalin (diglycoside) accumulates in bitter almond seeds [9]. Amygdalin was isolated from cyanoglycoside seeds using HPLCH, a special phase colon LC-18 (150 mm x 4.6 mm, 5 m). As a motile phase, acetonitrile:the water system (50: 50) was passed at a rate of 0.5 ml/minute and the detection was carried out at a wavelength of 215 nm. Since the linearity of the experiments was 0.9949, the detection limit for amygdalin was 0.88 and 2.93 mg, respectively. [10].

The effect of solvents on the output of amygdalin in Almond blossom dust has been studied. The time of extraction, ultrasound on it, concentration of solvents, the effect of the ratio of solid and liquid phases on the extraction process were examined. A spectrophotometric method was used to quantify amygdalin. According to the results, the best solvent is 100% ethanol, solid:liquid ratio is 1:7, ultrasound exposure time is 30 minutes, extraction lasts 720 minutes is considered moderate. Under these conditions, the amygdalin content in flower pollen was 6.1 % [11]. A review of the literature on bitter almond kernels provides extensive information on its benefits and harms, and is toxic for containing amygdalin glycoside. When amygdalin decomposes under the action of water, benzaldehyde and cyanide acid are formed, which are toxic to life. Literature data from recent years indicate the increasing importance of bitter almond processing products used as fungicides, bactericides and antimicrobials, as well as in medicine and cosmetics. Essential oils of bitter almonds, the main ingredient in benzaldehyde, are recommended for use as fungicides for agriculture [12-14].

Amygdalin, a substance isolated from grains containing cyanoglycoside in its seeds, is widely used in medicine in China, Iran, Mexico and many other countries [15-19].

2 Materials and methods

Wild almonds needed for research (Amygdalus nana L.) oil was obtained from the Nurota District of the Navoi region of the Republic of Uzbekistan, where it was grown in 2022. Wild almond fruits were separated from the cereal and soaked in boiling water for 1-2 minutes. From the amount of 100 g of wild almond grains, 25 g of kernels were isolated. Then the mag was separated from the oil at room temperature in the equipment "AKITA JP". The amount of extracted oil compared to 100 g of seed was 32 g.

The main indicators of the oil were carried out by spectral analysis (plasma-induced mass spectrometer) on the ICP-MS a 70 equipment. To do this, the sample was placed in special heat-resistant flasks in the amount of 0.1, and 10 ml of cones were added to them. Nitric acid and 1 ml of perchlorate acid were condensed and heated in an electric heater until a dry residue remained (up to a constant mass). The sample prepared in the same imitation mass spectrometer using induced bound plasma with the program "SEMIGUANT", "TEST.M" was analyzed. Equipment capacity parameters: plasma capacity 1200W integration time 0.1 seconds, equipment calibration I quantitative calculations using the standard of 24 multi elements of the firm "AGILENT TECHNOLOGIST".

3 Results and discussion

Wild almonds (Amygdalus nana L.) the oil is yellowish, with a characteristic smell and a slightly bitter taste. Its main physicochemical indicators are given in Table 1. If compared to bitter almond oil it turns out that the value of the acid number in wild almonds is high.

The number of soaps of wild almond oil is slightly smaller than the number of iodine, density and refraction numbers for both of these oils, close values were observed.

Table 1. Comparison of wild and bitter almond oil.

Number indicators	Wild almond oil	Bitter almond oil
Acid number.	1.83	0.29
Number of saponification. mg KOH/g	191.68	196.69
Iodine number. mg/100 g	99.74	100.02
Number of refraction. nd20	1.4498	1.4677
Density g/cm3	0.986	0.918

According to the analysis of fatty acids of wild almond oil, an abundance of unsaturated acids (Table 2) can be seen in the composition of this oil. The total amount of saturated acids in this oil is 10.28%. The oil has a palmitic acid content of 7.63% and stearic acid is 1.95%. The amounts of myrisitin and palmitoolene, on the other hand, are very low.

The content of oleic and linolenic acids in wild almond oil is 72.88% and 16.84%, respectively. Such oils contain a small amount of arachinone and gadoleic acid. At the moment, it turned out that the amount of total unsaturated acids goes up to 89.72%.

Table 2. Fat acids composition of wild almond oil.

Fatty acids	Peak capture time. minutes.	Wild almond oil
Myristic	14:0	0.02
Palmitine	16:0	7.63
Palmitoleic	16:1	0.52
Stearin	18:0	1.95
Olein + linolene	18:1+18:3	72.88
Linoleum	18:2	16.84
Arachin	20:0	0.07
Eikosen	20:1	0.09
∑ saturated fatty acids		**10.28**
∑ unsaturated fatty acids		**89.72**

The composition of the element was studied by spectral analysis (plasma-induced mass spectrometer) on the ICP-MS a 70 equipment of wild almond oil (Table 3). According to him, the composition of the oil is rich in chemical elements.

Table 3. Result of element analysis of the wild almond oil.

N	the element	of wild almond oil, mg/kg
1	Ag	0.00021
2	Al	0.78641
3	As	0.00038
4	Ba	0.01825
5	Ca	6.15433
6	Cd	0.00007
7	Co	0.00018
8	Cr	0.00993
9	Cure	0.05253

10	Fe	0.50148
11	To	0.00096
12	K	0.30121
13	Neither	1.49232
14	Mn	0.00899
15	To	0.00687
16	Fix	0.00039
17	Se	0.00022
18	Sr	0.00799
19	Mg	0.40012
20	V	0.00058
21	Zn	0.02989
22	Pb	0.00688
23	R	0.52250
24	Hg	0.00656

Manganese (0.00899 mg/kg), selenium (0.00022 mg/kg), copper (0.05253 mg/kg), ZINC (0.02989 mg/kg), cobalt (0.00018 mg/kg), nickel (0.00687 mg/kg) and other elements present in the oil's role in the implementation of human skin regeneration processes. The high content of Fe, Ni, Mn, Cr, Cu, Zn Biometals in the oil is of sufficient importance, as well as the importance of biochemical processes in the body (the exchange of proteins, carbohydrates, lipids, the formation of blood and bones).

The zinc element is a metal that is part of all enzymes and is involved in many substance exchange processes. It allows all cells in the body to grow and function in Division, normally. It is important in the formation of the skin, the normal growth of nails and hair, wound healing, increased body weight in the brain, increased immunity. Strengthens memory and increases the ability to remember and prevents anemia by participating in blood production. Zinc is a natural antioxidant. The presence of zinc in wild almond oil at 0.02989 mg/kg indicates that it is a necessary microelement for the body.

The element chromium determines the sugar balance in the body and is involved in the process of carbon exchange. Chromium in the cell regulates cholesterol in the blood and the formation of nucleic acids. It helps in the breakdown of fats in the body and keeps the processes of energy metabolism in a normal state. The norm for the continuous entry of 6 mcg of chromium into the body is determined. Wild almond oil was found to contain chromium 0.00993 mg/kg.

Iron is considered one of the most necessary trace elements for the body. Iron is present in the blood and is a component of hemoglobin. Hemoglobin functions to take oxygen from the lungs and deliver it to tissues and cells, and after that, with the help of hemoglobin, the body breathes, Wild almond oil was found to have an iron content of 0.50148 mg/kg.

Table 4. Result of determination of microbiological purity of wild almond oil.

Indicators (get 1 or 1 ml)	**Requirements by regulatory document**	**Result of the analyses**	**Compatibility of MH to request**
Enterobacteriacae	No more than 102	not	fits
Salmonella	Should not be	not	fits
Escherichia coli	Should not be	not	fits
total number of aerobic bacteria	No more than 10^4	<10	fits
total number of fungi	No more than 2×10^2	<10	fits

4 Conclusion

According to the results obtained, the main physicochemical indicators of wild almond oil were determined. Wild almond oil was found to have a total unsaturated acid of 89.72 and a total saturated acid of 10.28%. The elemental composition of wild almond oil was observed that there is an abundance of basic macro-and microelmetns and trace elements that play an important role in the regeneration of human skin. The microbiological purity of wild almond oil has been found to respond to students shown in the regulatory documents.

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