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PHYSICAL-CHEMICAL INDICATORS OF PLUM OIL OBTAINED BY THE PRESSING METHOD

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Abstract: The purpose of this research work was to study the physicochemical properties of oils obtained from the fruits of plum, peach and apricot growing in the mountainous and mountainous regions of our republic. This work analyzes the physicochemical properties of oils obtained by pressing from plums, apricots and peaches from local fruit trees. The physical properties of oils obtained from apricot and peach kernels were compared with those obtained from plum kernels. During this analysis, it was found that the physical properties of oils obtained from apricot and peach kernels are very similar to each other, and some parameters of oil obtained from plum kernels differ from peach and apricot oils. The content of plum oil obtained by pressing method was checked based on international standard requirements. Agilent Technologies 6890 N gas-liquid chromatography was used to analyze fatty acid content. Based on the results of the research, when analyzing the physico-chemical and fatty acids of oils obtained from fruit seeds, it was found that the amount of unsaturated fatty acids in plum oil is 92.81%, and the amount of saturated fatty acids is 7.19%. When the oil obtained by the pressing method was analyzed, it was concluded that this oil can be used in the production of various products in food industry.

Keywords: plum seeds oil, apricot oil, peach oil, fatty acid content, unsaturated fatty acids, acid number, iodine number, Agilent Texnologiyes 6890 N.

Introduction. According to the data of the State Statistics Committee, the value of Uzbekistan's foreign exports in January-August 2022 is about 22.6 million. Exported 46,700 tons of plums worth US dollars. It is noted that the export of plums increased by almost 28,100 tons compared to the same period last year.

The following are the countries to which Uzbekistan exported the most plums in the last 8 months: Kazakhstan - 28,200 tons, Russia - 16,400 tons, Kyrgyz Republic - 1,900 tons, Belarus - 102.2 tons. Also, regions that exported the most plums abroad in 8 months: Fergana region - 15.5 thousand tons, Surkhandarya region - 6.7 thousand tons, Samarkand region - 5.5 thousand tons [11]. As can be seen from the figures, the demand for plum fruit is increasing year by year.

Based on this, the main goal of the research is aimed at the comprehensive use of secondary raw materials of fruit seeds and obtaining high-quality plum oil based on them. One of the main challenges facing the food industry is the collection, processing and conversion of recyclable waste into useful by-products. In these ways, it is possible to use food waste, generate additional income, and at the same time minimize the

problem of waste disposal. The seeds of certain fruits (apricots, cherries, peaches, plums, cherries and cherries) are obtained as waste during the canning and drying of fruits.

In the process of processing seeds fruits, their seeds are collected in large quantities, which can be used as a source of nutrients. Apricots, peaches and cherries are used in confectionery and bread production [8]. They have been studied by several researchers [6; 7; 4] used in the production of various food products. Apricot, peach and cherry kernels contain 10.8-57% fat, 23-30% protein, 15-19% carbohydrates and 2.5-3% ash. Oils contain a large amount of unsaturated fatty acids, including olein (31-80%) and linoleic (6.3-51%), and plum kernels contain 30-60% fat, 24- 25% protein, 2.4-3.6% ash. The oil contains a large amount of unsaturated fatty acids, olein 69.80%, linole 74.91%[11].

Plum is a seedless fruit tree belonging to the family of rhododendrons. More than 30 species are known. The most common type is the common plum, which is believed to have originated from the natural crossbreeding of the mountain plum and the wild plum.

His homeland is Middle Asia, he entered Uzbekistan through Iran. In terms of cultivated area in our country, it is second only to apricot among pome fruit trees.

After the seedling is transplanted, it will be harvested in 3-5 years. 20-25 years gives a good yield (up to 30 kg-100 kg). Lives 30-35 years. Compared to peaches, apricots and cherries, it is cold-resistant (up to -30 degrees). 10 varieties are grown in Uzbekistan. Depending on the variety, it is recommended for cultivation in different regions of our country. The experiences of the USA, Canada and Chile, which are the most advanced in the world in the cultivation of black plum fruits, are being studied, and a system of increasing the production of black plums in the territories of the republic and directing them to export is being established[12] .

Hungarian domestic variety of plum , Hungarian violet variety , Washington variety as Ispolinskaya variety , Superior variety , Chernosliv Samarkandsky variety , Yarkhi variety are being planted [12].

The Hungarian purple variety of plum fruit was selected. The fruit has the shape typical of Hungarians, dark blue, covered with a thick waxy dust, the fruit is large, weight - 46 g. The flesh is orange, tender, very fleshy, sweet, tasty, fragrant. The flesh is well separated from the flesh. The variety ripens in the middle of the second ten days of August . The productivity is -319.5 Apricot, peach and cherry kernels, the highest productivity is 410.7 Apricot, peach and cherry kernels. Recommended for planting in all regions of our country .

Plum seeds vary in shape and size depending on the type and variety. The amount of seed from the fruit is 5% - 12%. Plum seeds consists of husk, membrane and pith. The fatty acids of plum oil consist of oleic and linoleic acids. The main constituent of the oil is triolene. Fresh plum oil is yellow to brown in color with a bitter almond smell and taste. Oil is used in medicine, perfumery, cosmetology and food [12].

Methodology. The experiment was conducted in the scientific laboratory of the Department of Food Products Technology of the Namangan Institute of Engineering and Technology. Plums were harvested when fully ripe. Brains were isolated from the bite box[11]. The kernels are washed in water and dried in the sun to remove the moisture

content. The drying process was carried out in a drying cabinet at a temperature of 100 - 110 C for 20-30 minutes. Kernels were ground in a grain grinder. Crushed kernels were pressed in AKITAJP-800 mini-press to obtain oil, the amount and physico-chemical properties of the produced oil were determined. Physico-chemical parameters of pressed oils were determined in laboratory conditions [9]. Experiments are carried out according to the normative documents of the Republic of Uzbekistan for test methods Interstate Standard(IS) IS 31933-2012, IS 3961-2020, Checked according to IS 31262, IS 26593-85, IS 11812-2022, IS 3961-2020 normative documents[14]. The obtained results were compared and contrasted with the physicochemical parameters of the oil obtained from other types of fruit kernels, peach and apricot kernels[1, 2]. The results of the study are presented in Table 1.

Table 1. Fruit seeds from the cores received of fats physical and chemical properties.

No	Indicators	Plum	Apricot	Peach
1	Light break down index , pv = 20S	1.4698	1.4710	1.4680
2	Density, g/cm ^{3}, 25C	0.914	0.901	0.912
3	Soaping number, mg KOH/g	192	191	190
4	Iodine number, g J_2/100 g	106	101	100
5	Peroxide number, mg-ev.kg fat leaving O_2 ,	0.12	2.82	3.0
6	Acid number, mg KOH/g	0.81	3.7	1.3
7	General fat content , %	50.9	38.82	39.5

Above given 3 types in the table fruit from the grains received of oils main physical and chemical indicators analysis done and was compared.

Table 2 in the literature given plum , apricot , peach of oils fatty acids composition and quantity given [1.2].

Table 2. The content of fatty acids in fruit kernel oil.

Fatty acids name	Amount of fatty acids, %		
	Plum	Apricot	Peach
Palmitin	5, 6	5.56	4.93
Stearin	1, 9	1.94	2.18
Olein	69.80	63.76	61.46
Linol	21.59	26.15	26.44
Linolene	0.05	1.01	0.10
Arachnid	0, 16	0.50	0.46

Seeds oils contained main physical and chemical from indicators again one is oil contained of fatty acids quantity is considered This of fatty acids content IS 30418-96 normative to the document basically was investigated [10,14]. Fatty acids feature their saturated and unsaturation with was evaluated.

Results. Liquid samples were used to determine the components of fatty acids. After shaking, the samples are placed in a 50 ml flask. To this is added 20 ml of 2N methanolic KOH solution and the flask is placed in a water bath. This mixture is boiled for 1 hour to carry out the saponification process of lipids. A 50% aqueous solution of H2 SO4 is added to the aqueous soap solution to break down the soap and extract the fatty acids . Addition of sulfuric acid is continued until the solution turns pink to methyl orange. The obtained acidic solution of fatty acids is extracted three times with diethyl ether in portions of 20-30 ml. The combined ether extracts were washed with distilled water until the medium became methyl orange neutral. The extracts are then dried over anhydrous sodium sulfate and the ether is removed in a rotary evaporator under a water jet vacuum. Freshly prepared diazomethane is used to convert fatty acids into methyl esters. For sample analysis, we use an Agilent Technologies 6890 N gas-liquid chromatograph equipped with a flame ionization detector and a capillary column of 30 mm length and 0.32 mm inner diameter coated with HP-5 phase. This analysis was performed at temperatures between 150 0 C and 270 0 C using helium as the carrier gas agent.

Table 3. Fatty acid composition of plum oil.

Fatty acids	No. 1
Miristin , 14:0	Few
Palmitin , 16:0	5.91
Palmitolein , 16:1	1.02
Stearin , 18:0	1.26
Olein , 18:1	74.91
Linol , 18:2	16.82
Lanolin , 18:3	0.05
Arakhin , 20:0	0.02
Eikosen , 20:1	0.01
Begen , 22:0	Few
Eruk , 22:1	Few
Lignetserin , 24:0	Few
$\Sigma_{\text{saturated FA (fatty acids)}}$	7.19
$\Sigma_{\text{unsaturated FA fatty acids)}}$	92.81

It can be seen from the above experimental results that the content of unsaturated fatty acids in plum oil is higher than that of apricot and peach oils [8].

Oil from fruit seeds and almond nuts must be produced in accordance with the requirements of this standard according to technological instructions approved in accordance with the established procedure.

Characteristics In terms of organoleptic indicators, oil from fruit seeds and almond nuts must meet the requirements given in Table 4.5.

Table 4.

Index	Oil characteristics			
	refined	hydrated	unrefined	
			1st grade	2nd grade
Transparency	Transparent		They don't standardize	
Smell and taste	Faint odor and taste of almonds		The smell characteristic of oils from fruit seeds and almond nuts.	
Oil color:	No darker than light brown		Taste is not determined	
apricot, peach and almond	No darker than light brown		No darker than dark yellow	
cherry, plum	No darker than light		Not darker than dark-brown	
oil mixtures			No darker than brown	

Table 5.

Oil	Processing method	Variety
Plum	Unrefined	1st; 2nd
	Hydrated	No variety
	Refined	No variety
Almond	Unrefined	1st; 2nd
	Hydrated	No variety
	Refined	No variety
Apricot	Unrefined	1st; 2nd
	Hydrated	No variety
	Refined	No variety
Cherry	Unrefined	1st; 2nd
	Hydrated	No variety
	Refined	No variety
Peach	Unrefined	1st; 2nd
	Hydrated	No variety
	Refined	No variety
Oil mixture	Unrefined	1st; 2nd
	Hydrated	No variety
	Refined	No variety

The results of the research conducted by foreign researchers on the content of KOH and peroxide (O2) in quince, acorn, and cherry fruit seeds, as well as the oiliness of the pulp [1.2].

The high content of unsaturated fatty acids, tocopherols, phytosterols, antioxidant bioactive components in the oils obtained from non-traditional oil plants is the reason for the industrial processing of fruit seeds and the wide use of oil products. It will be introduced into the daily consumption of the population. The experiment shows that the moisture content, ash, and protein content of the seeds are low, as well as the oil content of the pulp is high, which shows that it is possible to extract oil from the seeds by cold pressing method.

Discussion. When analyzing the physico-chemical and organoleptic parameters of the oil obtained from the core of plum fruit kernels, it was found that the amount of glycoside contained in this kernel oil was 0.3-0.5% higher, while the vitamin contained in some kernel oils, it was concluded from the analyzes that it is superior in terms of the abundance of macro-microelements.

Conclusion. Summing up from our research work, it is possible to increase the range of oils used in various industries, especially in pharmaceuticals, cosmetology and food industry, by complex processing of plum fruit seeds. With that one in line fruit seeds from the cores efficient of use also developed technologies to exit is achieved.

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