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THE USE OF POWDERS FROM EXTRACTS OF LEAN FRUITS OF ZIZIFUS (UNABI) AND KARELINIA CASPIAN IN THE TECHNOLOGY OF FLOUR CONFECTIONERY PRODUCTS

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Abstract: The article is devoted to the actual problem of resource conservation, as well as increasing the nutritional value and safety of flour confectionery products. The fruits of ziziphus (unabi) and the above-ground part of the Caspian Karelinia, due to their unique composition of functional ingredients and biologically active substances, are universal food fortifiers. The possibility of replacing sugar in the formulation of flour confectionery products (in this case, biscuits) with powders from extracts of fat-free test raw materials has been substantiated. The analysis of the influence of the investigated additives on the quality indicators, preservation and microbiological indicators of the finished product was carried out. Using the methods of evidence-based medicine, the expediency of using the studied plant raw materials in the technology of preparing flour confectionery products has been established, which will increase, to a certain extent, the physiological effect of their use in the diet.

Keywords: flour confectionery, ziziphus (unabi), Caspian Karelinia, extract, powder, quality, safety.

Introduction

In connection with the realities of our time, namely, the continuous growth of the population, the deterioration of the ecological situation and the stagnation of the economy caused by the current pandemic of coronavirus infection, the problem of food resources, providing the population with healthy and affordable food for all social strata of the population around the world is becoming increasingly important.

In Uzbekistan, large-scale measures are being taken to implement one of the most important tasks of the state in the field of social policy, namely, to protect and improve the health of the population. The share of functional products on the domestic market is currently not large, but this segment is developing dynamically and is very promising as a means of prevention, early correction and prophylaxis of various diseases. In recent years, the republic has been implementing consistent reforms for the rational use of natural resources. The search for additional sources of raw materials is also being actively pursued, platforms for their cultivation are being created. Special attention is paid to the plants most adapted to cultivation on marginal lands, tolerating drought well and beginning to bear fruit quickly.

One of the most promising directions for solving these global problems is the use of non-traditional plant raw materials, both cultivated and wild, containing ingredients valuable from the point of view of nutritional physiology, the study of the effect of which on the human body is currently receiving considerable attention from researchers and food manufacturers, especially in high demand among the population.

These products primarily include bread, bakery and flour confectionery. Recently, in the production of "enriched" products from high-quality wheat flour, products of processing of fruit and berry and vegetable raw materials, as well as phyto-additives from medicinal plants, especially in the form of powdered semi-finished products (powders), have become increasingly important. This will make it possible to enrich products with essential food substances and reduce the risk of developing alimentary-dependent diseases, the so-called "diseases of civilization", and the use of additives in the form of powders will solve the problem of the seasonality of raw materials

supply [1, p.12-13; 2, p. 3-12; 3, p. 35-37; 4, p. 101-107; 5, p. 4-5; 6, pp. 137-138].

These studies are especially relevant in connection with the Resolutions of the President of the Republic of Uzbekistan No. PP - 4406 dated July 29, 2019 "On additional measures for deep processing of agricultural products and further development of the food industry" and No. PP - 4870 dated April 10, 2020 "On measures for the protection, cultivation, processing of wild medicinal plants and the rational use of available resources ", which provides for" ... the use of advanced scientific achievements in the cultivation and processing of medicinal plants, increasing the export potential of the industry ... ".

The development of methods for the production of flour confectionery products using domestic plant raw materials, including wild-growing ones, the biopotential of which has not yet been sufficiently studied, contributes to obtaining perfect types of competitive products and increasing the economic efficiency of confectionery production.

The purpose of the work was in the formulation and production technology of biscuits with powders from fat-free extracts of ziziphus (unabi) fruits and the above-ground part of the Caspian Karelinia in order to reduce the prescription amount of sugar.

The objects of research were powders from fat-free extracts of fruits of ziziphus (hereinafter PZ (U)) and the above-ground part of the Caspian Karelinia (PC), biscuits "Dairy".

Korzhiks are flour confectionery products made from bakery wheat flour of the highest grade with the addition of granulated sugar, fat, egg and dairy products, as well as chemical leavening agents. By the method of molding, they belong to sand-removable products. Currently, the bakery industry produces dairy cakes, which are very popular among preschool and school children.

The experimental part of the work was carried out in the laboratories of the food technology department of the Bukhara Engineering and Technological Institute, the Institute of Plant Chemistry of the Academy of Sciences of the Republic of Uzbekistan and the Central Accredited Complex of the Testing Laboratory of the Bukhara Center for Sanitary and Epidemiological Well-being (accreditation certificate UZ.AMT.07.MAI.493).

Scientific research on this work was carried out using modern generally accepted methods for studying the properties of raw materials, described in the manuals [7,8]. The quality indicators of the biscuits were determined in accordance with the requirements of O'z DSt 315: 2011 “Milk biscuits. Specifications "in terms of organoleptic and physicochemical indicators.

The products of processing of fruits of ziziphus or unabi (Ziziphus jujuba Mill.) Of varieties "Yuzhanin" and "Samarkandsky 38" and of the above-ground part of the Caspian Karelinia (Karelinia caspia) were studied.

Ziziphus real - a shrub (Fig. 3.1-a) or a small deciduous tree with small greenish-white flowers and small juicy, fleshy fruits similar to dates, common in Central Asia, belongs to the buckthorn family and has about 50 species. The fruits of ziziphus (Fig. 1-b) have long been used in folk medicine in the treatment of arterial hypertension [9, p.31-33; 10, pp. 229-335]. Ziziphus fruits are able to regulate the synthesis of erythropoietin in the liver, stimulate the process of hematopoiesis, the saponins contained in them - jujubosides have cardioprotective properties, polysaccharides have an immunomodulatory effect on the human body [11, p.50-61; 12, p. 813-816; 13, pp. 445-453].

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а)

Figure 1- The appearance of the plant (a) and the fruits (b) of ziziphus or unabi

Karelinia, also Akbash (lat.Karelinia), a monotypic genus of plants of the Inuleae group, the Asteraceae family (Fig. 2), is a perennial herb with a well-developed root system, is an optional halophyte. [14, p.3-7].

а) б)

Figure 2- Appearance of the plant (a) and flowers (b) Karelinia

Karelian grass is used as raw material. It is harvested during mass flowering and is used as a medicinal raw material, since preclinical pharmacological studies have shown that this herb, being practically non-toxic, has a pronounced hypoglycemic effect [15, p.78-82]. The specific biological activity of the herb is due to the complex of biologically active substances contained in it, among which water-soluble polysaccharides dominate in quantitative terms. It has been established that alanine, glycine, glutamic acid and proline predominate among amino acids in quantitative terms. It should be especially noted that glycine and alanine regulate blood sugar levels; therefore, preparations from the aerial part of Karelinia are recommended for the treatment of diabetes mellitus [16, p.14-18].

To obtain plant extracts from fat-free raw materials (fruits of ziziphus and the terrestrial part of the Caspian Karelinia), the maceration method was used, namely the technology of long-term infusion of raw materials with an extractant, which was a water-ethanol mixture with a mass fraction of alcohol 50.0 ... 55.0%. A standard suction filter was used to separate the extract from the raw material. Then the extract was evaporated in a BUCHI vacuum evaporator (Germany), dried in a Heto Dry Winner freeze dryer, and ground in an LZM laboratory mill. The passage through sieve No. 38 was 65.0 ... 68.0, the residue on the sieve was 2.0 ... 3.0%.

The dough for biscuits was prepared from wheat flour of the highest grade with a corresponding adjustment of the recipe for the biscuits (Table 1), taken as a comparison sample (prototype).

Table 1. Recipe for the preparation of milk cakes

Name of raw materials	Mass fraction dry matter, %	Raw material consumption, kg			
		ПЗ(У)		ПК	
		actually	in dry substances	actually	in dry substances
Wheat flour of the highest grade	86,00	37,73	32,45	37,02	31,84

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Flour (for dusting)	86,00	2,11	1,81	2,11	1,81
Sugar - sand	99,86	14,40	14,38	15,00	15,00
Margarine	84,00	8,80	7,39	8,80	7,39
Melange	27,00	2,70	0,73	2,70	0,73
Milk	88,00	6,90	6,07	6,90	6,07
Baking soda	50,00	0,56	0,28	0,56	0,28
Vanillin	99,85	0,02	0,02	0,02	0,02
Ziziphus powder (unabi)	95,15	6,00	5,71	-	-
Powder from Karelinia Caspian	95,10	-	-	6,00	5,70
Semi-finished product weight	-			77,00	
Output, %				75,00	

The effect of powders from extracts of fat-free fruits of ziziphus (unabi) and the aerial part of the Caspian Karelinia on the properties of the dough and the quality of the biscuits was investigated. The research results are shown in Fig. 3, 4 and in Tables 2 - 4.

The study of the viscosity properties of the dough for biscuits was carried out by the method of capillary viscometry, which makes it possible to evaluate the viscosity properties from the dependences of the shear stress θ on the shear rate γ, as well as the flow curves depicted in logarithmic coordinates $lg\ \theta = lg\ \theta(lg\gamma)$

Experimental flow curves of wheat dough samples (control), as well as dough with plant extracts in an amount of 6.0% by weight of flour, were described by rheological equations of state (1-3):

$$\theta = \frac{\theta_{0a}^2}{\theta} + K\gamma^n \quad (1)$$

$$\theta = \frac{\theta_{0\beta}^2}{\theta} + K\gamma^n \ , \quad (2)$$

where $(\theta_{0_a}^2) \equiv (\pm\theta_0)$ и $(\theta_{0\beta}) \equiv (\pm\theta_0)$ (3)

The rheological equations of state are fundamentally different and in logarithmic coordinates have a characteristic multidirectional curvature of the sections, depending on the increase in the shear rate.

The graphs of the flow curves of the rheological equation of state in the region of low shear rates are convex to the axis of shear stresses, but with an increase in the shear rate, the direction of the convexity of their graphs turns to the axis of the shear rate. This can be explained by the superiority of elastic properties over plastic ones at the beginning of the flow curve, which changes to the opposite with increasing values of the shear rate. And the flow curve of the rheological equation of state has a curvature opposite to the curvature of the graph of the equation and characterizes the change in the plastic - viscous flow of the object of study at low shear rates to elastic - viscous - in the region of large values of the shear rate.

It was found that in experimental samples with additives, due to the increased content of sugars in the dough, a decrease in the numerical values of the limiting shear stress was observed θ_o and the consistency coefficient k with an increase in the flow index n of the test samples relative to the reference sample (without additives). Using the method of capillary viscometry, the effect of sugar in reducing the elastic-viscous and forming the viscous-plastic properties of the dough was established, since sugar has dehydrogenating properties.

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An increase in the concentration of sugar in the dough led to a decrease in the degree of swelling of flour colloids and an increase in the content of free water in the dough in the form of a sugar solution, which causes the dough to thin.

Figure 3 shows the dependence of the effect of plant extracts on the parameters of the rheological equation of state of the dough.

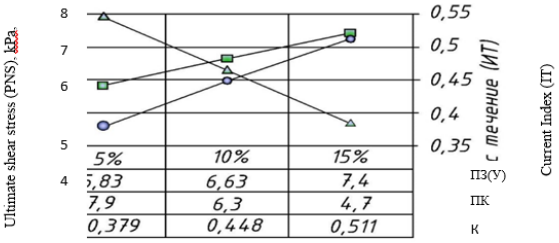


Figure 3 - Influence of the content of plant extracts on the parameters of the rheological equation of state of the dough

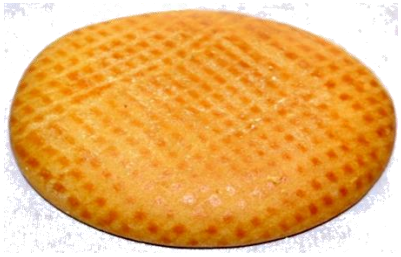
From the data in Fig. 3 it can be seen that in the test with the studied powders, the value of the limiting shear stress θ_o increases, and the consistency coefficient k decreases. This explains the more intense drop in the effective viscosity of the dough (by an average of 8.4%) with an increasing gradient of the shear rate of the test samples as compared to the dough samples without additives.

Such an intensive change in the effective viscosity is associated with the relaxation of the dough structure due to a decrease in the amount of gluten in the flour when it is replaced with plant extracts. An increase in the flow index of n samples of dough on wheat flour with plant extracts also indicates a decrease in its viscosity properties. In addition, the flow curves of the dough samples with extracts have a curvature opposite to the graphs of the flow curves of wheat dough without additives.

Thus, the experimental data on the assessment of the rheological properties of the dough confirmed that the greatest decrease in the strength characteristics of its structure is observed in the experimental versions (with additives).

The investigated additives influenced the quality indicators of the biscuits. The finished product was analyzed 4 ... 6 hours after baking (Fig. 4, Tables 2-4).

Control ПЗ(У)



ПК

Figure 4.5 - Appearance of biscuits without additives (control), experience with the addition of 6.0% PZ (K) and PK

Table 2. Influence of food additives on the quality of cakes made from premium wheat flour

Indicators	Value of indicators		
	Control (prototype)	ПЗ(У)	ПК
Color	Uniform, light yellow	Uniform, yellow-brown	
Smell	Inherent to this type of product, without foreign smell		
Taste	Specific to this type of product	Specific to this type of product, moderately sweet	
Surface	Smooth, characteristic of this type of product		

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Broken view	The product is baked, without traces of impurities. Color light yellow	Color light brown	
Humidity,%	14,5	14,2	14,3
Alkalinity, hail	2,1	1,6	1,4
Mass fraction of sugar in terms of dry matter,%	31,0	32,4	31,5
Mass fraction of fat in terms of dry matter,%	14,0	13,7	13,7
Wetness,%	106,2	108,6	108,2

It was found that the use of the studied powders led to a slight darkening of products, a decrease in alkalinity by 1.3 ... 1.5 times (due to organic acids of additives), an increase in the mass fraction of sugar by 1.6 ... 4.5% (due to its own sugars additives), increasing the degree of wetting by an average of 1.9%.

The prototypes of the biscuits met the requirements of O'z DSt 315: 2006 “Milk biscuits. Technical conditions ". Based on the results of the studies carried out, production recipes for this type of product and technological regulations have been developed and approved.

We studied the effect of additives on the drying process of the biscuits (without packaging) during storage (Table 3). The recommended shelf life is 120 hours. The initial weight of the biscuits after baking - 75 g.

Table 3. Influence of the studied pastes on the drying of the biscuits during storage

Kind of cakes	Change in the weight of the biscuits (shrinkage)			
	after 60 hours		after 120 hours	
	weight, in g	in% to the original mass	weight, in g	in% to the original mass
Control	70,2	- 6,4	63,4	- 15,5
Software (U)	72,5	- 3,3	68,2	- 9,1
PC	71,8	- 4,3	67,5	-10,0

The use of powders from the raw materials under study helps to slow down the drying process of the biscuits, that is, to reduce the degree of their drying by an average of 6.4 and 5.5% relative to the control sample (without additives) after 7 days of storage.

Microbiological indicators of the studied biscuits after 7 days of storage are presented in table. 4

Table 4. Microbiological indicators of the quality of biscuits

Indicator	Value of indicators			
	According to ND, no more	*control*	*ПЗ(У)*	*ПК*
QMAFAnM, CFU / g, no more	5×10^3	$1,4\times10^3$	$1,1\times10^3$	$1,2\times10^3$
BGKP (coliforms), in 1 g	No extra	Not detected		
Staphylococcus aureus in 0.1g	No extra	Not detected		
Pathogenic, including salmonella in 25 g	No extra	Not detected		
Yeast, CFU / g, no more	50	27	21	22
Molds, CFU / g, no more	50	31	26	28

From the data table. 4 it follows that the investigated control and experimental samples of biscuits after 7 days of storage without packaging for microbiological indicators met the requirements of SanPiN No. 0366-19 (5.5.9. Gingerbread, gingerbread ... without filling).

According to the results of a toxic biological study of the effect of products with additives on the clinical picture and behavioral reactions of experimental animals (rodents), no significant differences from those in the intact group were revealed. No statistically significant differences were found in the morphological composition of the blood of animals in the experimental and control groups.

Thus, the possibility was substantiated and experimentally confirmed the feasibility and safety of using the investigated natural additives from local fruit raw materials and medicinal herbs in the production of flour confectionery products from high-quality wheat flour in a dosage not exceeding 6.0% by weight of flour with a corresponding adjustment of the dosage of sugar and flour. in the product recipe.

Literature:

1. Амброзевич Е.Г. Особенности европейского и азиатского подходов к ингредиентам для продуктов здорового питания /Е.Г. Амброзевич//Пищевая промышленность. – 2005. -№4. – С.12-13.

2. Батурин А.К. Концепция здорового питания и коррекция избыточного веса /А.К. Батурин, М.М. Гаппаров, Б.П. Суханов, В.А. Тутельян // Новые медицинские технологии. – 2008. - №2. – С.3-12.

3. Дробот В.И. Использование фруктово-ягодных добавок в хлебопекарном производстве / В.И. Дробот, В.Ф. Доценко // Пищевая промышленность. – 1986. - № 3. – С. 35-37.

4. Йоргачева Е.Г. Потенциал лекарственных, пряно- ароматических растений в повышении качества пшеничного хлеба / Е.Г. Иоргачева, Т.Е. Лебеденко // Технология и оборудование пищевых производств. Восточно – Европейский журнал передовых технологий. – 2014. - № 12 (68) / том 2 . – С.101-107.

5. Кочеткова А.А. Современная теория позитивного питания и функциональные продукты/ А.А. Кочеткова, А.Ю. Колеснов, В.И. Тужилкин // Пищевая промышленность. – 1999. -№4.– С.2-5.

6. Diet, Nutrition and the Prevention of Chronic diseases; Report of a Joint WHO/FAO Expert Consultation; World Health Organization, Geneva, 2003.-148 p.

7. Виноградова А.А. Лабораторный практикум по общей технологии пищевых производств / А.А. Виноградова, Г.М. Мелькина, Л.А. Фомичёва [и др.]; Под ред. Л.П.Ковальской. – М.: Агропромиздат. – 1991. – 335 с.

8. Подлегаева Т.В. Методы исследования свойств сырья и продуктов питания: Учебное пособие / Т.В. Подлегаева, А.Ю. Просеков. Кемеровский технологический институт пищевой промышленности.- Кемерово: Изд-во Кемеровского технолог. ин-та пищ. пром-ти. - 2004.- 101 с.

9. Дедова И.А. Плоды унаби - функциональный пищевой ингредиент/И.А. Дедова, Е.И. Сажина//Пищевая промышленность. – 2015. - №3. – С.31-33.

10. Преснякова В.С. Стандартизация сухого экстракта плодов унаби (Ziziphus jujuba Mill.)/ В.С. Преснякова, Н.Т. Фарманова, З.В. Турдиева//Химия растительного сырья. – 2020. -№1. – С.329-335.- URL: http://journal.asu.ru/cw/article/view/ 5220.

11. Барнаулов О.Д. Краткий обзор лекарственных свойств унаби Ziziphus jujuba/О.Д. Барнаулов//Традиционная медицина. – 2016. - №2(45).- С.50-61.

12. Пономаренко Л.В. Унаби – кладезь здоровья и долголетия. Современные аспекты производства и переработки сельскохозяйственной продукции/Л.В. Пономаренко//Сборник статей по материалам III научно-практической конференции студентов, аспирантов и молодых учёных, посвящённой 95-летию

Кубанского государственного аграрного университета. – Краснодар, 2017. – С.813-816.

13. Chang S.C. Structual characterization of polysaccharides from Zizyphus jujube and evaluation of antioxidant activity – Int./ S.C. Chang? B.Y. Hsu, B.H. Chen // J. Biol. Macromol. – 2010. - Nov 1.- Vol.47(4). – Pp.445-453.

14. Икрамова М.Ш. Морфологическое и анатомо-диагностическое изучение надземной части Карелинии каспийской/М.Ш. Икрамова, Х.М. Комилов //Фармацевтический журнал.-Ташкент. - 2014. -№1. –С.3-7.

15. Лубенцова О.В. Изучение препарата «Диакар» на течение аллоксанового диабета/ О.В. Лубенцова, Х.У. Алиев, М.Ш. Икрамова, Х.М. Комилов//Фармацевтический журнал.- Ташкент. - 2013. -№2. –С.78-82.

16. Икрамова М.Ш. Изучение углеводного комплекса Карелинии каспийской/М.Ш. Икрамова, Х.М. Комилов//Фармацевтический журнал.- Ташкент.- 2012. –№2. - С.14-18.