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INFLUENCE OF PHYTOSUPPLEMENTS GROWING IN UZBEKISTAN ON THE QUALITY OF FLOUR PRODUCTS

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ABSTRACT

The aim of the study was to develop a recipe and technology for the preparation of lingering cookies, gingerbread, rusks with medicinal herbs: peppermint (Mentha piperíta), camel thorn (Alhagi pseudalhagi), stevia (Stevia rebaudiana Bertoni), growing in Uzbekistan. The chemical composition of the used phytoadditives was studied.

It has been established that the addition of powders of medicinal plants in dosages from 0.5% to 2.0% has a positive effect on the quality of finished products (hard cookies, gingerbread). The products were distinguished by good porosity, pleasant smell and taste, additionally enriched with vitamins, microelements to a level corresponding to the physiological needs of a person. An increase in the concentration of powders to 2.5% or more in flour confectionery products leads to the appearance of a slight bitterness in taste, a slight darkening of the crumb of products and a deterioration in its porosity structure.

In the production of crackers, the recommended dosage of A. Pseudalhagi powder is 5% by weight of flour and 25% of the calculated amount of water with the addition of A. Pseudalhagi extract.

The use of plant powders slows down the process of staling, lengthens the shelf life, preventing the molding process of products.

The authors consider it possible to use medicinal herbs: peppermint (Méntha piperíta), camel thorn (Alhagi pseudalhagi), stevia (Stevia rebaudiana Bertoni) growing in Uzbekistan in the production of long biscuits, gingerbread, crackers for medical purposes while maintaining satisfactory organoleptic and physical properties. - chemical indicators.

KEYWORDS: Flour confectionery, biscuits, gingerbread, biscuits, therapeutic and prophylactic products, medicinal herbs, herbal supplements, peppermint (Méntha piperíta), camel's thorn (Alhagi pseudalhagi), stevia (Stevia rebaudiana Bertoni).

1. INTRODUCTION

Confectionery and crackers are among the important and favorite components of the diet of children and adolescents, but most of them are low in vitamins, minerals, and dietary fiber, the deficiency of which in children's nutrition is a serious problem in our country [1].

Studies conducted by the Institute of Nutrition of the Russian Academy of Medical Sciences revealed a deep deficiency of vitamin C (3.5-6 times less than the physiological norm), vitamins of group B (B1, B2, B6) in more than 50% of the examined children. Insufficient supply of folic acid was found in 36% of children (in the northern regions, the deficit reaches 64%); vitamins of group E - in 47% (in some regions it is 87%). The majority of the children's population of the CIS countries have a reduced concentration of calcium, iron and other micronutrients, including fluorine, zinc, iodine, and especially the essential trace element - selenium,

which is an important element of the body's antioxidant defense. The deficiency of dietary fiber reaches 50% [2,3].

In this regard, in recent years, more and more attention in the confectionery and baking industry has been paid to the development and production of therapeutic and prophylactic products, which contain preparations of biologically active substances or natural components that can increase their nutritional value (cookings from vegetables and fruits, fruit and berry powders, etc.). One of the sources of biologically active substances are medicinal plants [4,5].

The use of medicinal plants is growing worldwide [6,7,8]. According to the World Health Organization (WHO), approximately 80% of the world's population now uses herbal medicines directly in teas or with water, milk and alcohol. Although modern synthetic medicines are mainly used in developed countries, the use of herbal medicines has increased significantly. There is a constantly high demand for plant material. It should be noted that most plants are of only partial interest for biotechnology and genetics, and their medicinal potential has not been discovered [9].

Medicinal plants have significant advantages over synthetic drugs: they contain a natural complex of biologically active substances, macro- and microelements, and in the most accessible and digestible form. Medicinal plants include fruits, berries, vegetables [10].

Object of study – flour confectionery products (gingerbread, cookies, crackers).

Subject of study – production process of flour confectionery products.

Purpose and objectives of the study. Development of new recipes for confectionery and crackers of a new generation with functional properties and a balanced composition for dietary and preventive nutrition with phytonutrients (peppermint, camel thorn, stevia).

II. METHODS

Scientific research on this work was carried out using modern generally accepted and special organoleptic (sensory), physicochemical, microbiological and biochemical methods for studying the properties of raw materials, semi-finished products and finished products. Statistical processing of the results was performed using correlation-regression analysis in Microsoft Excel 2013 and MathCad 15 environments [11,12].

III. RESULTS

One of the mandatory components of the treatment and prevention of diabetes is rational nutrition planning, which is due to the most significant fluctuations in blood sugar after meals during the day. A diabetic diet is a permanent therapeutic measure associated with certain restrictions on carbohydrate foods in the patient's diet. Therefore, a diabetic diet is a rational nutrition planning that allows you to normalize not only metabolic disorders, but also ensure normal physiological processes in the body [13].

At present, the main principle of rational nutrition planning in diabetes mellitus is the maximum compliance with the regimen of hypoglycemic therapy and adapted nutrition, i.e. the balance between the sugar-increasing effect of food, which consists in increasing the level of sugar in the blood immediately after its intake, and the hypoglycemic effect of the prescribed drug therapy [14] .

The main principle of rational nutrition planning in diabetes is the reasoned choice of foods low in easily digestible carbohydrates, i.e. selection of diabetic products.

It was revealed that respondents aged 40 to 60 show the highest interest in diabetic products, and the age of a significant part of diabetic patients is more than 55 years old, whose financial capabilities are limited.

Taking this into account, when creating diabetic food products, it is necessary to use inexpensive domestic

raw materials and, above all, raw materials of plant origin as prescription components.

Thus, the analysis of the role of the alimentary factor in correcting the nutritional status of patients with diabetes mellitus confirmed the urgent need and timeliness to solve the problem of creating high-quality inexpensive domestic diabetic flour confectionery products to ensure the prevention of diabetes mellitus, as well as for their use in clinical nutrition.

Taking into account that the created products should have not only high nutritional and physiological value, but also the optimal cost, plant raw materials growing on the territory of Uzbekistan (Tashkent, Bukhara region) - peppermint (Méntha piperíta), camel thorn (Alhagi pseudalhagi), stevia (Stevia rebaudiana Bertoni).

IV. DISCUSSION

The objects of the study were dry leaves of stevia (Stevia rebaudiana Bertoni), collected during the flowering period and dried at a temperature of 55-60˚C to inactivate enzymes that destroy diterpene glycosides (table 1).

Table 1. Chemical composition and nutritional value of dried stevia leaves (Stevia rebaudiana Bertoni).

Name of indicator	Indicator value
Mass fraction, %:	
Moisture	10,00-11,00
Proteins	9,40-10,70
Lipids	0,50-1,90
carbohydrates, including:	26,58-28,19
monosaccharides	0,82-1,14
disaccharides	0,61-1,40
starch	1,57-1,73
dietary fiber	23,58-23,92
extractives, including:	37,70-38,10
diterpene glycosides	16,80-17,20
minerals	8,37-8,75
Mass fraction of vitamins, mg %:	
P	71,24-71,87
B_2	35,42-36,17
E	22,85-24,24
B_1	9,45-11,30
B_6	9,07-10,12
C	7,80-9,53
β- carotene	4,74-5,46
PP	3,46-4,73

From the data in Table 1, it can be seen that dry stevia leaves contain a number of physiologically valuable ingredients - dietary fiber, vitamins, minerals, as well as diterpene glycosides, which determine their sweet taste, which makes it possible to use stevia as a sugar substitute in the production of flour products. confectionery.

It has been established that, in terms of safety, dry stevia leaves meet the safety requirements for additives and herbal products [15].

Camel thorn (Alhagi pseudalhagi) is a thorny shrub, less often a herbaceous perennial plant up to 1 m in height. Camel thorn ordinary - the most famous species of this plant, is common in desert and semi-desert regions of the southeast of the European part of Russia, throughout the Caucasus, Asia Minor and Central Asia, as well

as in Siberia and the Urals. It grows on sands, gray soils, wastelands, along the banks of rivers and canals [16,17,18].

Medicinal raw materials are the aerial part (grass) collected during the flowering of the plant and after it, fruits and roots are used less.

Studied (Table 2) chemical analysis of the aerial part of the camel thorn (Alhagi pseudalhagi). It has been established that this herb contains a rich complex of biologically active substances, including organic acids, essential oils, rubber, alkaloids, vitamins (C, K, B groups, carotene), tannins, catechins, flavonoids (rutin), leukoanthocyanidins, coumarins, sterols (cholestenol) [20,21,22].

Table 2 **Chemical composition of powder from Alhagi.pseudalhagi**

Indicators	Values
Mass fraction of solids, %	85,94±0,20
Mass fraction of sugars, %	22,67±0,30
Mass fraction of essential oil, %	0,33±0,01
Mass fraction of alkaloids, %	0,17±0,01
Mass fraction of tannins, %	16,54±0,50
Mass fraction of catechins, %	9,64±0,30
Mass fraction of fiber, %	15,98±0,30
Mass fraction of ash, %	10,70±2,00

Peppermint (Méntha piperíta) contains an essential oil (1.0-2.5%), the main ingredient of which is menthol. In addition, the plant contains tannins (6–12%), bitterness, carotene, betaine, hesperidin, ursolic, oleic, and melissa acids, terpene compounds, pinene, and cineole [19].

Table 3 shows the nutritional content (calories, proteins, fats, carbohydrates, vitamins and minerals) of mint per 100 g of edible part.

Table 3. **Nutritional value and chemical composition of peppermint (Méntha piperíta)**

The nutritional value	Vitamins	Macronutrients	Trace elements
Calories 70 kKal	Vitamin A (РЭ) 212 mgk	Calcium 243 mg	Iron 5,08 mg
Squirrels 3,75 gr	Vitamin B1 (thiamine) 0,082 mg	Magnesium 80 mg	Zinc 1,11 mg
Fats 0,94 mg	Vitamin B2 (riboflavin) 0,266 mg	Sodium 31 mg	Copper 329 mgk
Carbohydrates 6,89 mg	Vitamin B3 (pantothenic) 0,338 mg	Potassium 569 mg	Manganese 1,176 mg
limentary fiber 8 gr	Vitamin B6 (pyridoxine) 0,129 mg	Phosphorus 73 mg	
Ash 1,76 gr	Vitamin B9 (folic) 114 mgr		
Water 78,65 gr	Vitamin C 31,8 mg		
Saturated fatty acids 0,246 gr	Vitamin PP (Niacin equivalent) 1,706 mg		

Research was carried out on the use of peppermint powder in the production of gingerbread, which was added in an amount of 1-3% to the recipe for raw gingerbread [20].

The results of the study of quality indicators of gingerbread prepared with the introduction of 1; 2 and 3% of mint powder to the mass of flour in the dough are given in table. 4. Products without the addition of peppermint powder served as a reference.

Table 4. **Influence of Peppermint Powder Application on Gingerbread Quality Indicators**

Indicators	**The quality of gingerbread with the addition of mint powder in %**		
	0	1-2	3
Organoleptic:			
form	Corresponds to this type of gingerbread		
surface	Unburnt, no cracks or swelling		
color	Specific to this product name		Светлый, с зеленоватым оттенком
break view	The porosity is developed, without voids, the crumb is light		Crumb with green splashes
taste and smell	Peculiar to this type of gingerbread, without foreign smell and taste		With menthol flavor
Physico-chemical:			
moisture content, %	12,0	12,5	13,0
mass fraction of total sugars, %	15,27	15,36	15,49
alkalinity, hail	0,50	0,43	0,25
wetness, %	120,20	183,15	140,91

The analysis of the data obtained showed that the quality of the gingerbread was not inferior to the control variant when the test powder was added to the dough in an amount of up to 2% by weight of the flour. The products were distinguished by good porosity, pleasant smell and taste, additionally enriched with vitamins, microelements to a level corresponding to the physiological needs of a person.

It was found that an increase in the dosage of more than 3% leads to a slight darkening of the product crumb and a deterioration in its porosity structure, as well as to the appearance of a mild taste and smell of mint powder.

In the future, when developing formulations for therapeutic and prophylactic products with medicinal herbs, the optimal dosage of powders was chosen in the amount of 2% by weight of flour.

To determine the ratio of prescription components, simplex-lattice planning of the experiment was used. Based on the data obtained, the coefficients of polynomials of the second degree, characterizing the output parameters, were determined. By combining the simplices for the selected indicators, rational dosages of the prescription components were established

The development of recipes for flour confectionery products that meet the specified requirements is to ensure a balanced chemical composition and high organoleptic characteristics. Optimization of the parameters of the developed products was carried out by modeling the recipe using the integral balance criterion for a wide range of indicators.

The use of medicinal plants with pronounced technological and physiological properties is the basis for creating recipes for diabetic flour confectionery products when they are modeled from the position of maximum balance.

Tables 5 and 6 show the developed recipes for diabetic flour confectionery products with medicinal herbs, and in table 7 the organoleptic and physico-chemical indicators of long biscuits, in table 8 the organoleptic and physico-chemical indicators of gingerbread with medicinal herbs, in table 9 the results of a study of quality indicators bread slabs and crackers prepared with the addition of powder and extract from A. Pseudalhagi.

Table 5 **Recipes for lingering biscuits with medicinal herbs**

Name of prescription components	**Consumption of prescription components in kind, kg**			
	«Vanilla» (control)	«Stevia»	«Yantak»	«Mint»
Wheat flour в/с	758,39	766,79	760,51	764,15
Margarine	139,01	133,86	135,13	135,37
Sugar	75,88	-	-	-
Corn starch	57,52	77,61	79,38	76,95
Syrup	39,82	38,34	38,34	38,34
Melange	26,70	25,71	25,71	25,71
stevia powder	absence	26,95	25,37	25,52
Carbon ammonium salt	5,27	5,27	5,27	5,27
drinking soda	5,23	5,23	5,23	5,23
Food salt	4,55	4,55	4,55	4,55
Vanillin	0,61	0,61	0,61	0,61
Camel Thorn Powder	-	-	23,19	-
Peppermint Powder	-	-	-	23,34

Table 6 **Recipes for gingerbread with medicinal herbs**

Name of prescription components	**Consumption of prescription components in kind, kg**			
	«Road» (control)	«Diabetic»	«Health»	«Raykhon»
premium wheat flour	436,7	576,33	568,14	570,58
Margarine	52,4	53,06	53,04	53,10
Sugar	231,01	a b s e n c e		
Syrup	218,34	221,09	221,01	221,22
Melange	13,1	13,26	13,26	13,30
Zhzhenka	8,74	8,85	8,88	8,86
Stevia powder	отсутствие	34,42	34,70	34,82
Carbon ammonium salt	1,31	1,20	1,20	1,20
drinking soda	3,5	3,56	3,56	3,56
Dry perfume	2,66	2,66	2,66	2,66
Camel Thorn Powder	-		27,61	-
Peppermint Powder	-			27,72

The traditional technological scheme for the preparation of hard cookies provides for the stage of dough aging, which is necessary to eliminate internal stresses in the dough and increase its plasticity, but, at the same time, lengthens the dough

preparation process before molding.

It should be noted that in the process of dough preparation, when phyto-powders from stevia and other herbs are added, the plasticity of the dough increases while its elastic properties decrease, and such a positive change in the rheological properties of the dough allows directing the dough for molding without preliminary aging.

Table 7. **Organoleptic and physico-chemical indicators of long biscuits with medicinal herbs**

Name of indicator	**Characteristics and value of the indicator**			
	«Vanilla» (control)	**«Stevia»**	**«Yantak»**	**«Mint»**
Form	Correct, without dents and deformations, the edges of the cookies are curly			
Surface	Smooth with a clear pattern on the front side, not burnt, without swelling			
Color	light golden	Dark golden		
Taste	light sweetness	Sweet with a pleasant aftertaste of spices		
Smell	Peculiar to the liver, without foreign smell of mustiness. Pleasant spice aroma			
View at a break	Baked cookies with uniform porosity, without voids and traces of unmixed			
Mass fraction, %: moisture	9,0	9,2	9,4	8,9
fat	12,5	12,2	12,3	12,4
Wetting, %	183	224	230	210
Density, kg/m3	553	464	468	461

Table 8. Organoleptic and physico-chemical parameters of gingerbread with medicinal herbs

Name of indicator	**Характеристика и значение показателя**			
	«Road» (control)	«Diabetic»	«Health»	«Raykhon»
Color	Golden	Brown		
Taste	Light Spicy taste	Sweet, pleasant spicy taste		
Smell	Neutral, not pronounced	Pleasant spice scent		
Form	Round, flat surface with cracks			
Structure	Finely porous, well loosened			
Mass fraction, %: moisture	12,6	12,9	12,8	12,9
fat	5,0	5,4	5,4	5,5
Density, kg/m3	478	450	445	449
Wetness,%	235	245	248	240

Table 9. **The influence of phytoadditives on the quality indicators of crackers and crackers**

The name of indicators	**Indicators of rusk slabs prepared**							
	without additives	with the addition of A. Pseudalhagi powder, % to flour weight					with the addition of an extract from A. Pseudalhagi, % to the mass of water	
		1,0	**3,0**	**5,0**	**7,0**	**10,0**	**25,0**	**50,0**
Breadboards								
Humidity, %	27,0	27,2	27,5	27,5	27,3	27,4	27,3	27,5
Acidity, hail	3,4	3,6	3,8	4,2	4,0	3,5	4,2	3,9
Specific volume, cm3/100 g	340	345	356	360	352	328	358	347
Crackers								
Humidity, %	10,0	10,2	10,4	10,4	10,3	10,5	10,3	10,5
Acidity, ºH	3,0	3,2	3,4	3,6	3,5	3,0	3,5	3,3
Swelling, %	400	420	450	470	460	430	465	458
Brittleness, units.	98	95	90	82	73	71	79	72
Mass fraction of sugar, %	12,1	13,5	13,7	13,8	14,4	14,7	12,9	13,6
Organoleptic evaluation, score	19	19	19	20	18	16	20	19

The positive effect of complex phyto-powders of medicinal herbs on the formation of consumer properties and physiological value of diabetic flour confectionery products has been revealed, their storage periods have been established to ensure safety and maximum preservation of consumer properties.

It has been established that the addition of powders of medicinal plants in dosages from 0.5% to 2.0% has a positive effect on the quality of finished products. The products were distinguished by good porosity, pleasant smell and taste, additionally enriched with vitamins, microelements to a level corresponding to the physiological needs of a person.

An increase in the concentration of powders to 2.5% or more leads to the appearance of a slight bitterness in taste and a slight darkening of the crumb of products and a deterioration in its porosity structure.

When including powders from Stevia rebaudiana Bertoni in the recipe of flour confectionery products, it is recommended to exclude the prescription amount of sugar by 100% of its total amount.

The use of plant powders slows down the process of staleness, lengthens the shelf life, preventing the molding process of products and expands the range of flour confectionery products for medical and preventive purposes.

The analysis of the data obtained showed that the quality of crackers and crackers was not inferior to the control variant with the addition of the studied powder from A. Pseudalhagi and with the addition of an extract from A. Pseudalhagi, % in the amount, respectively, of 5% to the mass of flour and 25% to the calculated amount of water Breadboards and ready-made crackers were distinguished by increased volumetric yield, regular shape, glossy surface, sufficiently developed porosity structure, characteristic taste and aroma. Rusks of these options had a relatively high swelling (19.8% higher than the control value) and reduced brittleness (32.0% less than the control value)[40.41]

It was found that increasing the dosage of powder from A. Pseudalhagi more than 7% to the prescription amount of flour and extract from A. Pseudalhagi more than 50% to the calculated amount of water leads to a slight darkening of the crumb of products and a deterioration in its porosity structure, as well as to the appearance of mild

aftertaste. and the smell of the powder. This suggests that when using these additives in the dough in an amount exceeding the recommended values, it is advisable to add prescription components that can mask these properties of finished products.

V. CONCLUSION

Theoretically and experimentally substantiated the feasibility and effectiveness of the use of peppermint (Méntha piperíta), stevia (Stevia rebaudiana Bertoni), camel thorn (A. Pseudalhagi) as a raw material for the production of physiologically functional dietary supplements.

Phytoadditives from Méntha piperíta, A. Pseudalhagi, Stevia rebaudiana Bertoni contain dietary fiber with a high degree of esterification, organic acids and monosaccharides, a complex of biologically active substances, which makes it possible to use it to improve the quality, biological value and shelf life of products.

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