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Development of Innovative Technology of a Specialized Drink of the Functional Purpose on a basis of Rósa aciculáris

SUMMARY

The study has formulated biomedical and technological requirements for composition, nutrition values ratio and functional drink safety on the basis of local wild berry product *Rósa aciculáris* with reference to test indicators of actual food of children, adolescents and young people living in the North; a technological scheme of the product's production has been elaborated. With applying the results of the research technical documentation and product manufacturing specification are elaborated, a check sample is obtained. The product will be recommended in the diet as an additional source of iron, iodine, calcium and other deficiency substances, as an alternative to synthetic fizzy drinks for recovery of the younger generation.

Keywords: actual food, balanced diet, food substances, food biotechnology, functional food, berry drinks, Rósa aciculáris, technical documentation.

INTRODUCTION. Despite the extending product range of baby and teenage food, functional food products, there is lack of availability of the innovative food products allowing to solve a problem of compensation of nutritious insufficiency today.

One of the main reasons for it is discrepancy to the declared and actual physiological value of produced functional products, and also lack of reliable information about the principles of rational nutrition and physiological value of food products among the population in general. The specified negative factors are compounded by the advancing growth of a share in the consumer market of refined, subjected to deep industrial processing and long-time storage of products, and also by increase of degree of food contamination by xenobiotics of various origin. The special lack is detected in the range of the functional products possessing immunomodelling, antioxidant, radioprotective and adaptogenny properties. It is also necessary to note that the functional products which are available in the market or have rather high cost and therefore aren't available to use in food of this category, or are characterized by low appeal to children that levels all their valuable functional properties [4].

The Republic of Sakha (Yakutia) is the main subject of the Far East region. It is rich not only by minerals, but also by other not less important natural resources, such as the wood, herbs, berries, mushrooms, fish and other representatives of nature. Renewable and almost inexhaustible wealth of the Siberian taiga is valuable also by that in a technogenic century it is environmentally friendly [10].

The main principle of creation of a functional food product of a new kind is achievement of the highest possible level of full value and the guaranteed safety of the product. During the developing and production of products of a functional purpose it is necessary to study a chemical composition of raw materials, a nutrition value, special methods of technological processing. Functional food allows not only to keep health, but also to replace medicines in a certain measure [1, 3].

Drinks are the most technological basis for creation of new types of functional products. From the point of view of functional foods are of special interest the soft drinks of a special purpose containing physiologically valuable, safe for health, having exact physical and chemical characteristics ingredients, properties of which are defined and evidence-based [3, 4].

Drinks of prophylactic action are alternative to carbonated drinks which according to research are "often" consumed by children, teenagers and the youth living in the Republic of Sakha (Yakutia). By means of prophylactic foods it is possible to reduce number of the diseases connected with aging by 80%, diabetes – by 50%, hearts – by 25%, organs of vision – by 20% [4].

Wild-growing berries are the great base for creation of a number of innovative drinks with additional functional properties [2].

Due to the above, the **aim** of the research is the development of innovative technology of specialized drink on the basis of local berry raw materials of a functional purpose for prophylaxis of scarce elements, such as iron-, iodine, calcium and other scarce elements.

For the first time on the basis of results of one-stage epidemiological researches the monitoring of actual food and food habits among children, teenagers and youth of the Republic of Sakha (Yakutia) is carried out, parameters of food products and separate feedstuffs in a diet of children, teenagers and youth are revealed in dynamics. Levels of consumption of food products and provision of rations with separate feedstuffs depending on the power value of diets are defined. On the basis of these parameters and food habits the orientation of physiologically functional properties of specialized drink of a functional purpose on the basis of local berry raw materials as optimum source of vitamin C, B5, beta carotene, food fibers, vegetable proteins and

complex carbohydrates with high power ability is studied. The biotechnology of specialized drink of a functional purpose on the basis of local raw materials is evidence-based and developed. The choice of specialized drink with the conditional name "Rosa" for baby and teenage food as one of useful products is theoretically reasonable.

Work is performed according to carrying out of scientific research work No. 3048 "Development and deployment of innovative technologies of specialized food products of local raw materials of a functional purpose for prophylaxis of scarce elementss and alimentary dependent diseases of children, teenagers and youth" in the context of basic part of the state task in the sphere of scientific activities for the Task "2014/257 for 2014, number of the state registration 01201460283 (the head of NIR, Candidate of Medical Science. Lebedeva U.M.).

MATERIALS AND METHODS.

Researches are made on the basis of the Center of prophylactic and medical foods of the population of the North of scientific research institute of health of NEFU of M. K. Ammosov. In the course of work the standardized epidemiological research on studying of the actual food and food habits among the population with using of standard methods is conducted: polling method, frequency method and method of daily reproduction of food.

The actual food was estimated by method of individual interviewing of respondents according to standards of the international program of WHO for the integrated prophylaxis of noninfectious diseases − CINDI. In work the special questionnaire developed at Institute of Nutrition and adapted to local conditions is used.

Microbiological, biochemical researches, technological tests of receiving industrial samples of a new type of specialized berry drink from local raw materials of a functional purpose and drawing up specifications and technical documentations are carried out by the standard technique.

When carrying out experimental researches we used modern methods of the physical and chemical analysis: IF - UV-and atomic absorptive spectrophotometry, photocolorimetry.

Safety of raw materials in the developed products was defined with use of modern methods and was estimated according to the content of toxic elements, microbiological and radiological indicators.

The energy value of food products was defined by calculation according to a chemical composition and to amount of the digested nutrients calculated on the basis of the energy value of the main substances.

Statistical processing of the actual material is made with using of a standard Microsoft Excel package, and also packages of the applied statistical programs STATISTICA 6.0, SPSS 12.0.

RESULTS OF THE RESEARCH.

When researching the actual food the expressed deficiency of the incoming received (proteins, fats, carbohydrates, vitamins, mineral substances and microcells) is revealed.

The analysis of the micronutrient status showed insufficiency of consumption of the main vitamins and mineral elements. The most expressed deficiency (less than 50% of norm) for children from 7 to 14 years is observed on such micronutrients as vitamin C, beta carotene, calcium, iron and zinc [6, 5].

The comparative analysis of the revealed nutritional status of children, teenagers and youth of the region with known data of a role of nutrients in activity of various systems of an organism confirmed (coefficients of correlation 0,86-0,94) an alimentary origin of the majority of the prevailing pathologies. Considering it, for optimization of the nutritional status and improvement of health of children, teenagers and youth of the region the creation of demanded types of the functional food products enriching by macro- and micronutrients deficiency of which exceeds 50%, namely by phospholipids, flavonoids, food fibers, vitamin C, beta carotene, and also bioavailable forms of calcium, iron [9].

For justification of a choice of basic food in order to create on their basis demanded functional food products, we studied preferences at a choice of food (from 7 to 14 years) and teenagers (from 14 to 18 years) of Yakutsk, it showed that the first place in a rating of children of younger age preferences is confectionery, and for teenagers it's fast food. The second place, in both age groups have is drinks, including power-drinks and cocktails. Considering the revealed needs for carbohydrate products from the simple refined carbohydrates in rations, the low nutrition and biological value of these foods, as basic products the berry drinks from local wild-growing raw materials containing high concentration of useful BAS were chosen.

It should be noted that among the factors causing the low food status of children, teenagers and youth, the essential role belongs to the economic and health- social reasons. Low social and economic level of many families doesn't allow to provide with adequate nutrition of children as this group of the population spend in the educational organizations at intensive process of training a lot of time. Considering it, the created functional product, along with the given set of physiologically functional properties, has to have the prime cost allowing to include it in the budget of food for the educational organizations; to be convenient in preparation, a

dosage, storage and transportation, and also to conform to the sanitary and hygienic requirements imposed to products of public catering. [4].

Considering the deficiency of fruit and berries revealed in rations of children, teenagers and youth, it is expedient to use products of processing of the last as bases of the created functional drinks. From positions of providing the maximum nutrition value it is expedient to carry out a choice of concrete types of berries from the product range, traditionally made in the region.

It is shown that the specified types of berry raw materials can be rather effective sources of food fibers, flavonoids, and also bioavailable minerals.

As a natural source of vitamin C and beta carotene it is offered to use dogrose powder. Such choice was caused by that the dogrose belongs to types of wild-growing raw materials, traditional for the region, [8].

Among a big variety of the bushes growing in the territory of Yakutia, the dogrose also takes a special place. Hips are rich with high content of biologically active agents, in particular, of vitamin C, or ascorbic acid, and vitamin P by which quantity the dogrose wins first place, and also thanks to the high maintenance of carotinoids, flavonoids, vitamins K, B2, E.

The drinks enriched with biologically active agents are included into extensive group of functional food, i.e. the products enriched with physiologically useful food ingredients improving health of the person.

At enrichment it is necessary to consider possibility of chemical interaction of the enriching additives among themselves and with components of the enriched product and to choose their such combinations, a ratio of components, forms, ways and stages of introduction which ensure their maximum safety in the course of production and storage [3].

The technological mode of drying of raw materials from berries by IF–radiation is worked out.

Method of preparation for drying includes in the frozen kind berries for maximum preservation of useful properties of berries, defrost of raw materials excluded.

Drying was made in the special dryer with IF – radiation. Drying of food products by infrared rays has the following advantages:

- opportunity to accelerate the process of heat treatment by increasing the capacity of the heat flux;

- reduction of bacterial contamination due to cell dehydration and coagulation of proteins protoplasm;

- opportunity to maximize the preservation of vitamins, amino acids, macronutrients, micronutrients.

When developing compoundings of concentrates of the functional drinks which received the conditional name "Rosa" we used the integral index of quality, including defined physiologically functional properties desired organoleptic characteristics and efficiency of dissolution.

Based on the analysis of biochemical properties of functional products designed block diagram creation of a specialized beverage functionality from local berries. Included in the database of physical and chemical parameters of raw materials, which can be made in a simulated product (a priori information must be constantly updated).

The flowchart of algorithm of the program of optimization of structure of compoundings of the projected specialized drink of a functional purpose on the basis of local berry raw materials is made.

The brought modern computer mathematical MatthCAD systems, Ekhse1 will be used for modeling of influence of a set and a ratio of the ingredients entering a compounding of the projected product on its carbohydrate, vitamin and mineral structure and power value and allow to make ranging, statistical processing, calculation and an assessment by quantitative criteria.

On the basis of the conducted researches the technology of receiving concentrates of functional Rosa drinks was developed. The block diagram of receiving concentrates of functional drinks is made and the technological modes are fulfilled.

Complex studying of radiological and microbiological indicators of a food additive, according to objectives of this stage of work is carried out.

In the conditions of the scientific research institute experimental laboratory of health of NEFU of M. K. Ammosov on pilot installation pilot batches of concentrates of functional drinks were developed.

The developed concentrates of drinks represented uniform powders of light brown color with the shade corresponding to a type of the used concentrate of berries.

The assessment of organoleptic indicators (transparency, color, taste and aroma) which is carried out by tasting showed that the developed drinks represent orange opaque (without suspension and a deposit) liquids with the harmonious aroma and taste corresponding to the used berry basis with notes of a dogrose and tart aftertaste.

We developed technical documentation TU specifications - 9185 – 001 – 44068275 – 2014 which extend on drinks berry of wild plants. Drinks intend for the direct use in food, and

also can be recommended as a preventive product since powder from a dogrose possesses the immunostimulating and antiseptic action.

Addition in drink of artificial dyes, the preserving substances, synthetic aromatic substances, essences isn't allowed.

The analysis of an ecological assessment of the developed technologies showed that, the content of the toxic substances found in the developed drinks was in limits of admissible concentration and met the requirements of the standard.

Results of market researches of the developed technologies show that within prospects of development and expansion of sale of finished goods animation of technology with introduction in various geographical regions of the Russian Federation can be provided, at the corresponding development the developed technologies can provide sufficient profitability and make a contribution to development of branch, in the light of the developed tendencies the developed technologies in the field of functional drinks are actual and demanded.

Researches evidence-based and developed innovative resource-saving, environmentally friendly, waste-free biotechnologies of production of functional berry products of new generation on an industrial basis, practical bases of receiving qualitatively new combined natural foodstuff on a berry basis with the set biochemical properties corresponding to requirements of an organism of peoples of the North are offered.

CONCLUSION.

In the light of the current tendencies the developed biotechnologies of production of specialized drink of a functional purpose on the basis of berry raw materials in the present stage are actual and demanded [7].

Considering that the market of functional food is very limited, the drink developed by us can take on it a worthy place. The combination of its useful properties and the acceptable price will make good argument for consumers at a product choice.

Thus, creation of functional drinks from local wild-growing berries in the Republic of Sakha (Yakutia) has strategic importance, and will allow not only to provide local population with qualitative production, but also will give the chance to enter the market of other regions of the Russian Federation, and it is possible, even for export [11, 12].

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