Nurgul Bazilovna Batyrbaeva – associate professor of the department «Technology of bread products and processing industries»; JSC «Almaty technological university», Republic of Kazakhstan, Almaty, Tole bi str. 100, e-mail: alua_01.02.03@mail.ru.

Редакцияға енуі 01.02.2024
Өңдеуден кейін түсуі 20.02.2024
Жариялауға қабылданды 21.02.2024

DOI: 10.53360/2788-7995-2024-1(13)-17

ISTIR: 65.51.29; 62.09.37

M.A. Issaliyeva[1]*, Z.B. Yessimsiitova[1], Y.A. Sinyavskiy[2], D.N. Tuigunov[2]
[1]Al-Farabi Kazakh National University, Republic of Kazakhstan,
050040, Republic of Kazakhstan, Almaty, 71/19 Al-Farabi Avenue
[2]Kazakh Research Institute of Processing and Food Industry,
050060, Republic of Kazakhstan, Almaty, st. Gagarina 238G,
*e-mail: mariyam.isalieva@gmail.com

DEVELOPMENT OF NEW TYPES OF TEA DRINKS WITH TARGETED PREVENTIVE PROPERTIES

Annotation: *Recently, interest in the production of tea and tea drinks has increased due to its nutritional and medicinal properties. The composition of tea is complex and is still not fully understood. Therefore, the development of new technology of tea and functional tea drinks opens a unique opportunity for domestic manufacturer to produce competitive products.*

In this study the technology of three types of tea drinks based on raw components of fruits, berries and medicinal plants «Antioxidant», «Immunostimulating», «Cardiovascular» with targeted preventive properties was developed, where the physicochemical, mineral composition and organoleptic parameters were studied.

The results of the analysis showed that the highest concentrations of vitamin C (mg/100 g) were found in sea buckthorn fruits (215.7±18.4), black currant fruits (196.5±14.3), melissa leaves (100.1±9.9), lemon peel (90.5±8.4) and Goji berries (49.5±3.8). High β-carotene content (mg/100 g) was observed in Goji berries, lemon balm leaves and sea buckthorn fruits – 91.3±7.6; 47.2±3.6 and 33.7±2.9 mg/100 g, respectively. In addition, fruits, berries and medicinal plants selected as raw components had high levels of flavonoids, xanthophylls, tocopherols, phenolic compounds and other biologically active substances. Cranberry berries (44.8±3.2), Goji berries (31.0±2.6), black tea leaves (25.4±1.9), black currant fruits (21.6±1.2) and peppermint leaves (15.2±1.1) had high levels of total antioxidants (mg/100 g) due to the increased content of catechins, anthocyanins, carotenoids, vitamin C, tannin and bioflavonoids, contributing to the reduction of oxidative stress and protecting cells from the destructive effects of free radicals. Prophylactic tea blends have been studied and shown to have high taste, fine exquisite aroma and actively stimulating and therapeutic properties, according to the created formulations, taking into account antioxidant immunostimulating activity.

Key words: *tea beverages, fruit raw materials, medicinal plants, antioxidant properties, immunostimulating properties, cardiovascular system.*

Introduction

The history of tea has evolved over several centuries. Tea is the best known and most commonly used plant. Since ancient times it has been used as a medicinal remedy. Tea quickly spread throughout the country and won the love of different segments of the population, and it is gradually becoming a favorite drink in people's daily lives. Ancient medicine believed that when taken internally, tea gives strength, strengthens the spirit, stomach, cures belching, dissolves mucous matter, drives away sweat, urine, and quenches thirst. Tea (Camellia sinensis L.) is the most complex and diverse plant in its chemical composition. The total number of compounds included in

its composition, isolated to the beginning of the XXI century, is about 300, some of them have not yet been identified, and the biochemical role of some of them is defined only in general terms. It should be borne in mind that the chemical composition of tea is relatively well studied. About 300 biologically active substances have been found in tea. In terms of caffeine content, tea surpasses coffee (up to 4%). It also contains a large amount of tannins, tannin essential oil, alkaloids. Determined, inorganic acids, starch, fiber, pigment chlorophyll, xanthophyll, carotene. Enzymes, glycosides have also been identified. Tea is very rich in phytoncides. In terms of protein content, tea is not inferior to legumes. Tea contains up to 7% of mineral substances – salts of Mg, I, F, Au, Fe, Cu, Ca, Mn [1].

Modern research has confirmed the views of the ancients on this valuable product. It is determined that tea intake, due to its antioxidant properties, has antitumor, antisclerotic effect. Green tea increases the secretion of digestive glands, improves digestion of proteins, fats, carbohydrates, slows down the absorption of cholesterol, has a pronounced antimicrobial effect [2]. People's taste preferences for tea drinking have changed in recent years. There is a constant increase in demand for green, fruit and herbal teas, which are associated with a healthy lifestyle.

In recent years, chronic nutritionally related diseases and immunodeficiency states have become one of the most important medical and social problems of world health care, due to their high prevalence and serious threats to public health [3]. One of the solutions to this problem is to rationalize the nutrition of the population by introducing specialized and functional food products for a healthy diet. Plant raw material one species or mixture of whole or crushed fruits, berries, buds, leaves, flowers, shoots, roots and other parts of plants other than plants belonging to any species of the genus Camellia of the family Theaceae.

The results of numerous applied scientific and technical studies indicate that various specialized food products based on fruit, berry and medicinal plant raw materials can have a directed tonic, immune stimulating and generally preventive effect. And yet the main struggle for the consumer is inextricably linked to the quality of tea, which is a complex category that includes a set of chemical, visual, organoleptic parameters, as well as processes associated with the collection, storage and brewing of this drink. The basis of high-quality tea is, of course, the raw material.

In this connection, it is urgent to develop scientifically substantiated and innovative in recipe and technological execution of tea drinks on fruit and vegetable basis of polyfunctional purpose for replenishing the deficit of a number of essential nutrients and improving the structure of nutrition of the population. Taking into account the above-mentioned, the aim of the present study was the design of recipe compositions on the basis of fruits, berries, medicinal raw materials of local growth for the development of tea drinks of preventive action.

Materials and methods of research

The objects of the present study were black and green tea leaves, freeze-dried fruits and berries, as well as medicinal plants with increased content of biologically active substances.

Physico-chemical and technological methods of research were used in the work. Acceptance of tea was carried out in accordance with the Interstate Standard (GOST) 1936-85 [4] «Acceptance rules and methods of analysis». Black and green tea leaves were accepted in batches. According to the mentioned normative document, the batch is considered to be the number of packing units with tea of one or several brands. Sampling was carried out in a closed room in accordance with GOST ISO 1839-2018 «Tea. Sampling» [5].

Mass fraction of moisture, protein, lipids, ash, vitamins and minerals were determined using chemical and physicochemical methods of analysis according to generally accepted methods of testing. Determination of mineral substances was carried out using the method of atomic adsorption spectrometry. Analysis of water- and fat-soluble vitamins in the composition of tea drinks was carried out using high-performance liquid chromatography.

Determination of beta-carotene content was carried out in accordance with GOST 8756.22-80 [6] «Fruit and vegetable processing products. Method for determination of carotene». Determination of the total content of antioxidants in products of plant origin was carried out on the device «TsvetYauza-01-AA» with amperometric detection. Amperometric detection consists in measuring the electric current in the cell, arising from the oxidation (reduction) of the analyzed substance on the surface of the working electrode when a certain potential is applied to it [7].

The estimation of the level of dry matter and moisture in dried fruits and vegetables was carried out in accordance with GOST 28561-90 [8] «Fruit and vegetable processing products. Methods for determination of dry matter or moisture».

Vitamin C level in fruit and vegetable raw materials, as well as in finished tea drinks was estimated in accordance with GOST 24556-89 [9] «Fruit and vegetable processing products. Methods of determination of vitamin C». Determination of vitamin E content in tea drinks was carried out in accordance with GOST EN 12822-2014 [10] «Food products. Determination of vitamin E (alpha-, beta-, gamma- and delta-tocopherols) by high-performance liquid chromatography».

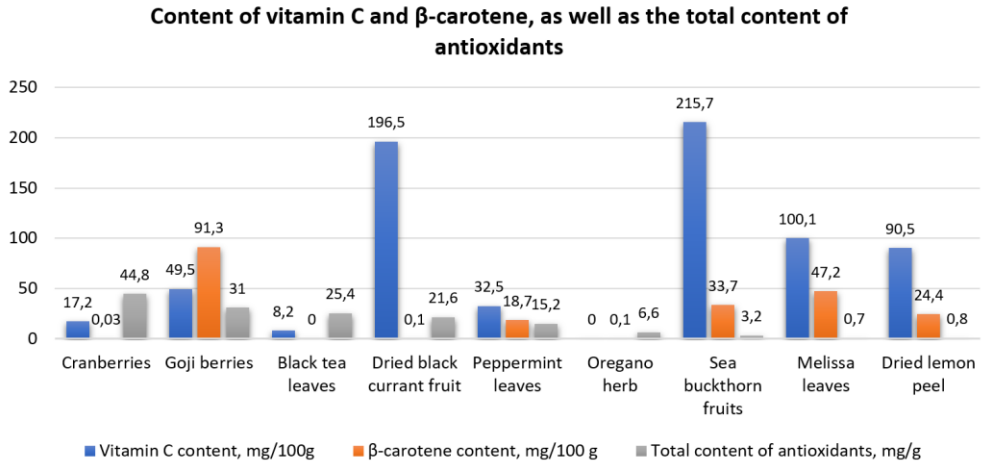
The mineral composition of tea drinks was analyzed in accordance with GOST 26928-86 [11] «Food products. Method for determination of iron» and GOST 26934-86 [12] «Raw materials and food products. Method for determination of zinc».

The level of bioflavonoids and organic acids in the composition of tea drinks was evaluated in accordance with R 4.1.1672-03 «Guidance on methods of quality control and safety of biologically active food additives».

Results and their discussion

As a result of designing new composite tea drinks «Antioxidant», «Immunostimulating» and «Cardiovascular» with pronounced preventive properties the selection of raw material sources with increased content of biologically active substances providing directed antioxidant and immunostimulating properties was carried out. To determine the scientific and experimental justification of the choice of plant components in the development of tea drink with targeted antioxidant properties, the content of vitamin C, β-carotene, total antioxidants in the used fruit and vegetable raw materials was studied. The analysis of the study showed that the high level of total antioxidants in cranberries, Goji berries, black tea leaves and freeze-dried black currant fruits is due to the high content of catechins, anthocyanins, carotenoids, vitamins C, E, tannin and bioflavonoids that regulate the protective functions of the body from free radical damage and prevent the development of oxidative stress in the body [13-14]. The results are summarized in Table 1.

Table 1 – Content of vitamin C and β-carotene, as well as the total content of antioxidants in the fruit and vegetable raw materials included in the tea drink.



It has been found that sea buckthorn fruits included in the formulation of tea drink have a high content of flavonols, xanthophylls, carotenes, tocopherols, vitamins A, C, E and β-carotene [15]. It has been shown that leaves of Melissa medicinalis contain substances of antioxidant nature including flavonoids, quercetin, rutin, rosmarinic polyphenols, caffeic acid and carotenoids. These phytochemical components are powerful antioxidants that help protect body cells from the harmful effects of free radicals and reduce oxidative stress [16].

The developed and designed formulation for the preparation of tea drink based on green tea, fruit and vegetable raw materials increases the protective functions of the body to the impact of external environmental factors, promotes nutritional support of the immune system of the body and prevention of nutrient-related diseases. It is revealed that immunostimulating properties of green tea leaves are associated with the content of polyphenols, catechins and epigallocatechins, vitamins,

amino acids and carbohydrates. Green tea leaves are rich in alkaloids, saponins, tannins, tannins, terpenoids, flavonoids, phenols and sterols [17]. Also, lemon peel (Citrus limon) is characterized by its high content of vitamin C, phenolic compounds and bioflavonoids [18]. Goji berries, having a favorable effect on the immune system and promoting the activation of T-lymphocytes, NK cells and immunoglobulins Lg G and LgA. According to the literature, ginseng root and eleuthero coccus herb contain tetracyclic triterpenoid saponins (ginsenosides), polyacetylenes, polyphenolic compounds and various polysaccharides [19,20].

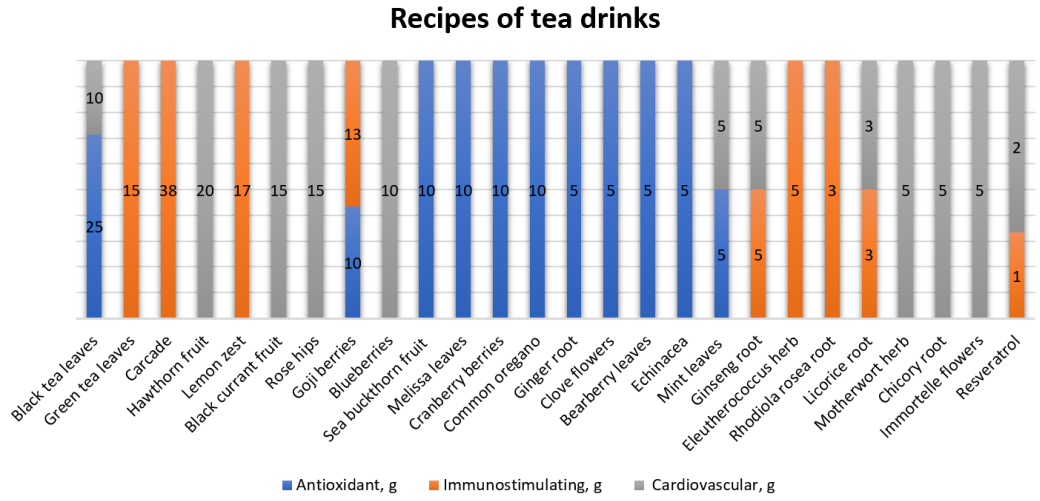
It is known that one of the widely used medicinal plants in the food industry is licorice root, which has pronounced immunostimulant and antioxidant properties. Licorice root is used for the prevention of a number of non-infectious diseases and antiviral conditions [21]. Resveratrol is a polyphenol contained in grape seeds, which has pronounced antioxidant and immunostimulant properties [22]. For use in the prevention of cardiovascular diseases, a composite tea drink has been developed, containing black tea leaves with the addition of a complex of freeze-dried berries and medicinal plants that have a favorable effect on the cardiovascular system.

Black currant hawthorn and rosehip fruits characterized by high content of vitamin A, C and E, phenolic compounds, anthocyanins, catechins, as well as macro- and microelements increase antioxidant capacity of the body, contribute to the reduction of blood cholesterol levels, improve heart muscle function and reduce blood pressure and the risk of arrhythmias [23,24]. Blueberries are also a good source of phenolic compounds, especially anthocyanins, which help to reduce blood pressure and high-density lipoprotein (HDL) cholesterol levels, which are potential predictors of cardiovascular disease [25].

Motherwort herb is of particular interest in the prevention of cardiovascular diseases due to its favorable effect on the functioning of a number of individual body systems [26]. The wide use of immortelle flowers in the prevention of cardiovascular diseases is due to the high content of polyphenolic compounds such as arzanol, homodimeric α-pyrone, phenolic acids and flavonoids [27].

Based on the uniqueness of the chemical composition and high biological value of the above-mentioned fruit and vegetable raw materials, the formulations of tea mixtures «Antioxidant», «Immunostimulating» and «Cardiovascular» were designed. Component compositions of tea drinks are given in Table 2.

Table 2 – Recipes of tea drinks



During the research, indicators of the nutritional value of dry tea drink blends were identified, as well as the content of minor and bioactive substances, including vitamins, minerals, bioflavonoids, tannins, etc.

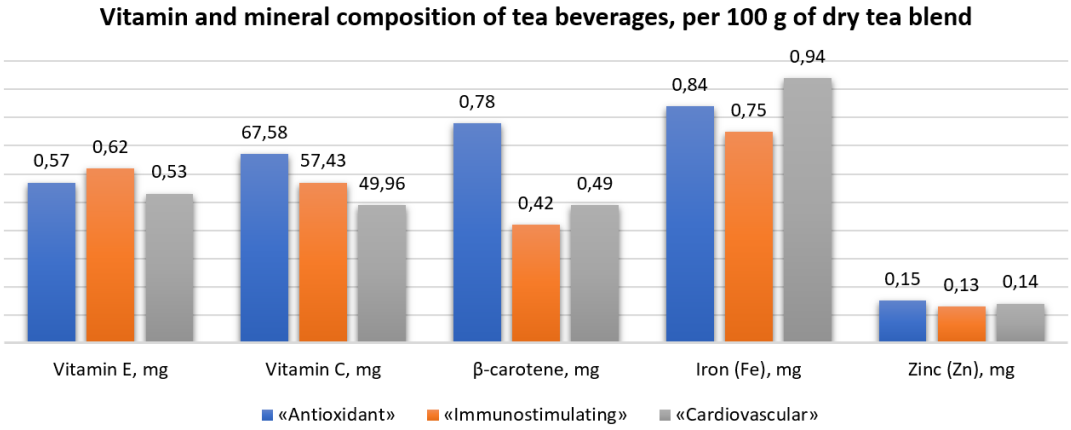
The results of studies regarding the physico-chemical characteristics of the developed tea blends indicate their high nutritional and energy value, which is attributed to the low protein and fat content, coupled with a high level of carbohydrates.

The results for the content of vitamins and macroelements in tea blends based on fruit and herbal ingredients are presented in Table 4.

Table 3 – presents the physicochemical characteristics of the developed tea beverages, calculated per 100 g of dry tea mixture.

Indicators	«Antioxidant»	«Immunostimulating»	«Cardiovascular»
Protein, g	0,76±0,05	2,91±0,05	1,49±0,09
Fats, g	0,92±0,06	1,56±0,06	1,02±0,06
Carbohydrates, g	82,05±4,1	76,18±3,8	79,34±3,98
Moisture, %	9,16±0,46	8,49±0,42	8,79±0,44
Ash, %	7,11±0,36	10,86±0,54	9,36±0,47
Energy value, kcal/KJ	339/1418	330/1380	332/1389

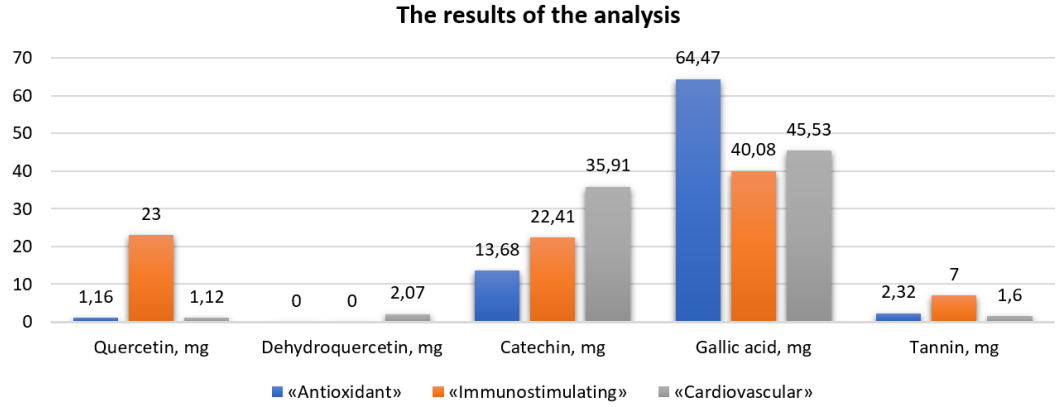
Table 4 – Vitamin and mineral composition of tea beverages, per 100 g of dry tea blend.



The evaluation of the vitamin and mineral composition of tea beverages revealed that the developed tea blends had a balanced composition of the investigated micronutrients, particularly vitamin C, E, β-carotene, iron, and zinc. Polyvitamin deficiency, as well as the deficiency of macro- and microelements, reduce the overall resistance of the body to viral and bacterial agents and increase the risk of developing various metabolic disorders, oncological, and cardiovascular diseases. Taking into account the above introduction into the diet of specialized products, in particular, functional fruit and herbal tea beverages with an increased content of natural bioactive substances, is an effective method of preventing these diseases.

In addition to vitamins and minerals, a special role in strengthening immunity, as well as in the prevention of cardiovascular diseases, belongs to bioflavonoids. Bioflavonoids, in combination with organic acids, give food products color and possess a wide range of beneficial properties. During the study, the levels of bioflavonoids and organic acids were determined in the developed tea compositions, including the content of quercetin, dehydroquercetin, catechins, gallic acid, and tannins.

Table 5 – The results of the analysis.



The results of conducted clinical studies indicate that incorporating foods with elevated levels of quercetin and its derivatives into the diet contributes to reducing the risk of developing

cardiovascular diseases and ischemic brain injuries, which are currently the most common pathologies in developed countries [28]. The research findings suggest that the developed tea beverages can serve as an additional source of quercetin in the body, with the highest level of this bioflavonoid observed in the «Immune-Boosting» tea beverage samples. Dehydroquercetin was present in only one tea blend sample – «Cardiovascular». Additionally, virtually all tea beverage samples showed a high content of catechins, gallic acid, and tannin, exerting targeted physiological effects, primarily antioxidant, and enhancing the body's protective functions and preventive action against various non-infectious diseases, as well as countering the negative impact of foreign compounds and adverse environmental factors.

Conclusion

Tea beverages, as mass consumption products, have long occupied an important place in the life of many countries around the world and have a rich history. Plant raw materials used in tea beverages include fresh or dried roots, stems, leaves, fruits, flowers, seeds, bark or whole plants of one or more plant species. The increase in tea beverage consumption over the last decade has paralleled the increase in organic production worldwide. Consumer demand for organic products is driven by their obvious environmental and human health benefits.

One of the promising directions of expanding the range of specialized tea drinks is modification of the component composition of traditional teas by introducing into the formulation of fruit and vegetable raw materials with an increased content of biologically active substances, in particular, vitamins, natural antioxidants, macro- and microelements, bioflavonoids, phenolic compounds and organic acids. At the same time, in the production of functional tea drinks it is necessary to use only natural raw materials of plant origin without the addition of ingredients obtained by chemical synthesis [29].

To date, unbalanced nutrition is the main risk factor for chronic diseases. In this regard, special attention is paid to the search for effective measures to correct nutritional deficiencies by creating new enriched food products based on local traditional and non-traditional natural raw materials, development of modern approaches to the development of new specialized food products of increased nutritional and biological value and filling the deficiency of a number of essential nutrients to improve the nutritional structure of the population. In our article, studies demonstrate that fruit and berry raw materials and medicinal plants can have a directed tonic, immune-stimulating and preventive effect. Consequently, the developed functional tea drinks for mass consumption and prophylactic purpose are designed according to the created recipes taking into account antioxidant immunostimulating activity, as well as their favorable effect on the cardiovascular system. Recipes and technology of functional tea drinks provide for the use of black and green tea leaves with the addition of traditional and non-traditional fruit and vegetable raw materials.

Based on the results obtained, the following conclusions can be drawn: black tea leaves, Goji berries, sea buckthorn cruciferous fruits, melissa medicinal, cranberry berries, common oregano herb, ginger root, clove flowers, bearberry leaves, Echinacea purpurea flowers and peppermint leaves have high biological value with directed antioxidant properties, Sea buckthorn fruit (215.7±18.4) black currant fruit (196.5±14.3), medicinal melissa leaves (100.1±9.9), lemon zest (90.5±8.4) and Goji berries (49.5±3.8) had the highest concentration of vitamin C (mg/100 g), the composition of Goji berries, melissa leaves and sea buckthorn fruit - 91.3±7.6; 47.2±3.6 and 33.7±2.9 mg/100 g had high β-carotene content (mg/100 g).The results of the studies showed that the tea blends had high sensory characteristics as well as a balanced content of minor substances.

References

1. Pochemu rasteniya lechat / M.YA. Lovkova, A.M. Rabinovich, S.N. Ponomareva i dr. – M.: Nauka, 1990. – 256 s.

2. Bositkhon ibn Zoҳidkhon Shoshii 2073 khil dorivor moddaning tibbii khosiyatlari / Bositkhon ibn Zoҳidkhon Shoshii – Tashkent: «Turon zamin ziyo», – 2014. – 652 s.

3. Sovremennyi vzglyad na lechenie defitsita zheleza i folievoi kisloty / A.I. Martynov, E.A. Lukina, A.G. Malyavin i dr. // Profilakticheskaya meditsina. – 2023. – № 26(7). – S. 80-87. https://doi.org/10.17116/profmed20232607180. (In Russian).

4. GOST 1936-85. Chai. Pravila priemki i metody analiza. – Vved. 1987 – 01 – 01. – M.: Standartinform, 2006. – 11 s. https://files.stroyinf.ru/Data2/1/4294833/4294833981.pdf.

5. GOST ISO 1839-2018. Chai. Otbor prob. – Vved. 2019 – 07 – 01. – M.: Standartinform, 2018. – 8 s. https://files.stroyinf.ru/Data/693/69344.pdf.
6. GOST 8756.22-80. Produkty pererabotki plodov i ovoshchei. Metod opredeleniya karotina. – Vved. 1981 – 01 – 01. – M.: Standartinform, 2010. – 6 s. https://meganorm.ru/Data 2/1/4294821/4294821421.pdf.
7. A systematic screening of total antioxidants in dietary plants / B.L. Halvorsen, K. Holte et al // The Journal of nutrition. – 2002. – 3(132). – C. 461-471.
8. GOST 28561-90. Produkty pererabotki plodov i ovoshchei. Metody opredeleniya sukhikh veshchestv ili vlagi. – Vved. 1991 – 01 – 07. – M.: Standartinform, 2011. – 11 s. https://files.stroyinf.ru/Data/73/7384.pdf.
9. GOST 24556-89. Metody opredeleniya vitamina S. – Vved. 1990 – 01 – 01. – M.: Iz-vo standartov, 2003. – 11 s. https://files.stroyinf.ru/Data2/1/4294829/4294829760.pdf.
10. GOST EN 12822-2020. Produkty pishchevye. Opredelenie soderzhaniya vitamina E (al'fa, betta-, gamma- i del'ta-tokoferolov) metodom vysokoehffektivnoi zhidkostnoi khromatografii, – Vzamen GOST EN 12822-2014; vved. 2016 – 01 – 01. – M.: Iz-vo standartov, 2014. – 25 s. https://files.stroyinf.ru/Index/57/57722.htm.
11. GOST 26928-86. Produkty pishchevye. Metod opredeleniya zheleza. – Vved. 1988 – 07 – 01. – M.: Standartinform, 2010. – 5 s. https://files.stroyinf.ru/Data2/1/4294827/4294827604.pdf
12. GOST 26934-86. Syr'e i produkty pishchevye. Metod opredeleniya tsinka. – Vved. 1986 – 12 – 01. – M.: Standartinform, 2010. – 11 s. https://files.stroyinf.ru/Data/123/12355.pdf.
13. Rasheed Z. Molecular evidences of health benefits of drinking black tea / Z. Rasheed // International Journal of Health Sciences. – 2019. – 13(3). – C. 1-3. PMID: 31123432; PMCID: PMC6512146.
14. Antioxidant and antiradical properties of cranberry juice and extracts / S. Caillet, J. Côté, G. Doyon et al // Food Research International. – 2011. – 5(44). – C. 1408-1413. https://doi.org/10.1016/j.foodres.2011.02.019.
15. Amagase H. *Lycium barbarum* (goji) juice improves in vivo antioxidant biomarkers in serum of healthy adults / H. Amagase, B. Sun, C. Borek // Nutrition Research. – 2009. – 29(1). – C. 19-25. doi: 10.1016/j.nutres.2008.11.005. PMID: 19185773.
16. Why is sea buckthorn (*Hippophae rhamnoides L.*) so exceptional? / Z. Ciesarova, M. Murkovic, K. Cejpek et al // A review. Food Research International. – 2020. – № 133. – C. 109-170. doi: 10.1016/j.foodres.2020.109170.
17. Miraj S. Melissa officinalis L: A Review Study With an Antioxidant Prospective / S. Miraj, Rafieian-Kopaei, S. Kiani // Journals Evidence-Based Integrative Medicine. – 2017. – № 22(3). – C. 385-394. doi: 10.1177/2156587216663433.
18. Yogesh A. Dound Health Benefits of Green Tea and Its Polyphenols: A Review / A. Yogesh // The Indian Practitioner. – 2020. – № 73(9). C. 33-37. http://articles.theindianpractitioner. com/index.php/tip/article/view/1052.
19. Das M. Citrus peel can make anti-oxidant rich food with free radical scavenging property: Development, acceptability and evaluation. / M. Das, P. Gupta // International Journal of Food Science and Nutrition. – 2018. – № 2(3). – C. 140-144.
20. Choi K.T. Botanical characteristics, pharmacological effects and medicinal components of Korean *Panax ginseng* C A Meyer. / K.T. Choi // Acta Pharmacologica Sinica. – 2008. – № 29. – C. 1109-1118.
21. Goulet E.D. Assessment of the Effects of *Eleutherococcus Senticosus* on Endurance Performance. / E.D. Goulet, I.J. Dionne // International Journal of Sport Nutrition and Exercise Metabolism. – 2005. – № 15(1). – 75-83. https://doi.org/10.1123/ijsnem.15.1.75.
22. Zhang Q. Chemical analysis of the Chinese herbal medicine Gan–Cao (licorice) / Q. Zhang, M. Ye // Journal of Chromatography. – 2009. – № 1216(11). C. 1954-1969.
23. Sylimarin as hepatic protector and immunomodulator in Nile tilapia during *Streptococcus Agalactiae* infection / M.S. Owatari, G.F. Alves Jesus, A. Brum et.al // Fish & Shellfish Immunology. – 2018. – № 82. – C. 565-572.
24. Yang B. Composition and health effects of phenolic compounds in hawthorn (*Crataegus spp.*) of different origins / B. Yang, P. Liu // Journal of the Science of Food and Agriculture. – 2012. – № 92. C. 1578-1590.

25. Patel S. Rose hip as an underutilized functional food. Evidence-based review / S. Patel // Trends in Food Science & Technology. – № 63. С. 29-38.
26. Wood E. Blueberries and cardiovascular disease prevention / E. Wood, S. Hein, C. Heiss et al // Food & Function. – 2019. – № 12. – С. 7621-7633. doi:10.1039/c9fo02291k.
27. The immunomodulatory potential of *Leonurus cardiaca* extract in relation to endothelial cells and platelets / B. Sadowska, B. Micota, M. Różalski, et.al // Innate Immunity. – 2017. – № 23(3). С. 285-295.
28. Everlasting flower (*Helichrysum stoechas Moench*) as a potential source of bioactive molecules with antiproliferative, antioxidant, antidiabetic and neuroprotective properties / F. Les, A. Venditti, G. Cásedas, et.al // Industrial Crops and Products. – 2017. – № 108. – 295-302.
29. Berry juices, teas, antioxidants and the prevention of atherosclerosis in hamsters / J.M. Rouanet, K. Décordé, D. Del Rio et al // Food Chemistry. – 2010. – № 2(118). – С. 266-271.

М.А. Исалиева[1]*, З.Б. Есимсиитова[1], Ю.А. Синявский[2], Д.Н. Туйгунов[2]
[1]Әл-Фараби атындағы Қазақ ұлттық университеті,
050040, Қазақстан Республикасы, Алматы қ., әл-Фараби даңғылы, 71/19
[2]Қазақ өңдеу және тамақ өнеркәсібі ҒЗИ ЖШС,
050060, Қазақстан Республикасы, Алматы қаласы, Гагарин көш. 238Г,
*e-mail: mariyam.isalieva@gmail.com

БАҒЫТТАЛҒАН ПРОФИЛАКТИКАЛЫҚ ҚАСИЕТТЕРІ БАР ШАЙ СУСЫНДАРЫНЫҢ ЖАҢА ТҮРЛЕРІН ӘЗІРЛЕУ

Жақында шай мен шай сусындарын өндіруге деген қызығушылық оның тағамдық және емдік қасиеттеріне байланысты артты. Шайдың құрамы күрделі және әлі күнге дейін толық зерттелмеген. Сондықтан шай мен функционалды шай сусындарының жаңа технологиясын әзірлеу отандық өндірушіге бәсекеге қабілетті өнім өндірудің бірегей мүмкіндігін ашады.

Бұл зерттеуде физика-химиялық, минералды құрамы мен органолептикалық көрсеткіштері зерттелген профилактикалық қасиеттері бар "Антиоксидантты", "Иммуностимуляциялаушы", "Жүрек-қан тамырлары" жемістерінің, жидектерінің және дәрілік өсімдіктерінің шикізат компоненттері негізінде шай сусындарының үш түрінің технологиясы жасалды.

Жүргізілген талдау нәтижелері С витаминінің ең жоғары концентрациясында (мг/100 г) қара қарақаттың жемістері (196,5±14,3), дәрілік лимон бальзамының жапырақтары (100,1±9,9), лимон қабығы (90,5±8,4) және годжи жидектері (49,5±3,8) болғанын көрсетті. В-каротиннің жоғары мөлшері (мг/100 г) годжи жидектерінде, лимон бальзамының жапырақтарында байқалды – сәйкесінше 91,3±7,6; 47,2±3,6 және 33,7±2,9 мг/100 г. Сонымен қатар, шикізат компоненттері ретінде таңдалған жемістер, жидектер мен дәрілік өсімдіктер флавоноидтардың, ксантофиллдердің, токоферолдардың, фенолдық қосылыстардың және басқа да биологиялық белсенді заттардың жоғары деңгейіне ие болды. Жалпы антиоксиданттардың жоғары деңгейінде (мг/100 г), годжи жидектері (31,0±2,6), қара шай жапырақтары (25,4±1,9), қарақат жемістері (21,6±1,2) және жалбыз жапырақтары (15,2±1,1) болды, бұл катехиндердің жоғарылауына байланысты, антоцианиндер, каротиноидтар, С дәрумені, танин және биофлавоноидтар тотығу стрессінің төмендеуіне ықпал етеді және жасушаларды бос радикалдардың жойқын әсерінен қорғайды. Антиоксидантты иммуностимуляциялық белсенділікті ескере отырып, жасалған рецептураларға сәйкес профилактикалық мақсаттағы шай қоспаларының нәтижелері зерттелді және көрсетілді, жоғары дәмдік қасиеттерге, нәзік тазартылған хош иіске және белсенді ынталандырушы және емдік қасиеттерге ие.

Түйін сөздер: *шай сусындары, жеміс-жидек шикізаты, дәрілік өсімдіктер, антиоксиданттық қасиеттер, иммуностимуляциялық қасиеттер, жүрек-тамыр жүйесі.*

М.А. Исалиева[1]*, З.Б. Есимсиитова[1], Ю.А. Синявский[2], Д.Н. Туйгунов[2]
[1]Казахский национальный университет имени аль-Фараби,
050040, Республика Казахстан, г. Алматы, пр. аль-Фараби, 71/19
[2]ТОО «Казахский научно-исследовательский институт перерабатывающей и пищевой промышленности»,
050060, Республика Казахстан, г. Алматы, ул. Гагарина 238 Г
*e-mail: mariyam.isalieva@gmail.com

РАЗРАБОТКА НОВЫХ ВИДОВ ЧАЙНЫХ НАПИТКОВ С НАПРАВЛЕННЫМИ ПРОФИЛАКТИЧЕСКИМИ СВОЙСТВАМИ

В последнее время интерес к производству чая и чайных напитков возрос благодаря его питательным и лечебным свойствам. Состав чая сложен и до сих пор не изучен до конца. Поэтому разработка новой технологии чая и функциональных чайных напитков открывает для отечественного производителя уникальную возможность производства конкурентоспособной продукции.

В данном исследовании была разработана технология трёх видов чайных напитков на основе сырьевых компонентов плодов, ягод и лекарственных растений «Антиоксидантный», «Иммуностимулирующий», «Сердечно-сосудистый» с направленными профилактическими свойствами, где был изучены физико-химический, минеральный состав и органолептические показатели.

Результаты проведенного анализа показали, что наибольшие концентрации витамина С (мг/100 г) имели плоды облепихи крушеновидной (215,7±18,4) плоды черной смородины (196,5±14,3), листья мелиссы лекарственной (100,1±9,9), цедра лимона (90,5±8,4) и ягоды Годжи (49,5±3,8). Высокое содержание β-каротина (мг/100 г) отмечалось в составе ягод Годжи, листьев мелиссы и плодов облепихи – 91,3±7,6; 47,2±3,6 и 33,7±2,9 мг/100 г соответственно. Кроме того, отобранные в качестве сырьевых компонентов плоды, ягоды и лекарственные растения обладали высоким уровнем флавоноидов, ксантофиллов, токоферолов, фенольных соединений и других биологически активных веществ. Высокие уровни содержания суммарных антиоксидантов (мг/100 г) имели ягоды клюквы (44,8±3,2), ягоды Годжи (31,0±2,6), листья черного чая (25,4±1,9), плоды черной смородины (21,6±1,2) и листья мяты перечной (15,2±1,1), что обусловлено повышенным содержанием катехинов, антоцианов, каротиноидов, витамина С, танина и биофлавоноидов, способствующих снижению уровня окислительного стресса и защищающие клетки от разрушительного воздействия свободных радикалов. Изучены и показаны результаты чайных смесей профилактического назначения, согласно созданным рецептурам, с учетом антиоксидантной иммуностимулирующей активности, обладают высокими вкусовыми качествами, тонким изысканным аромат и активно стимулирующими и лечебными свойствами.

Ключевые слова: *чайные напитки, плодово-ягодное сырье, лекарственные растения, антиоксидантные свойства, иммуностимулирующие свойства, сердечно-сосудистая система.*

Сведения об авторах

Мариям Абдурашитқызы Исалиева* – магистрант кафедры биоразнообразия и биоресурсов, Казахский национальный университет имени аль-Фараби, Республика Казахстан; e-mail: mariyam.isalieva@gmail.com.

Зура Беркутовна Есимсиитова – кандидат биологических наук, доцент, кафедра биоразнообразия и биоресурсов, Казахский национальный университет имени аль-Фараби, Республика Казахстан; e-mail: zura1958@bk.ru. ORCID: https://orcid.org/0000-0002-4735-2033.

Юрий Александрович Синявский – ТОО «Казахский научно-исследовательский институт перерабатывающей и пищевой промышленности», Республика Казахстан; e-mail: sinyaskiy@list.ru. ORCID: https://orcid.org/0000-0001-6339-6995.

Диляр Нурдунович Туйгунов – ТОО «Казахский научно-исследовательский институт перерабатывающей и пищевой промышленности», Республика Казахстан; e-mail: dilyar117@gmail.com. ORCID: https://orcid.org/0000-0001-5548-6675.

Авторлар туралы мәліметтер

Мариям Абдурашитқызы Исалиева* – биоалуантүрлілік және биоресурстар кафедрасының магистранты, Әл-Фараби атындағы Қазақ ұлттық университеті, Қазақстан Республикасы; e-mail: mariyam.isalieva@gmail.com.

Зура Беркутовна Есимсиитова – биология ғылымдарының кандидаты, доцент, биоалуантүрлілік және биоресурстар кафедрасы, Әл-Фараби атындағы Қазақ ұлттық университеті, Қазақстан Республикасы; e-mail: zura1958@bk.ru. ORCID: https://orcid.org/0000-0002-4735-2033.

Юрий Александрович Синявский – «Қазақ өңдеу және тамақ өнеркәсібі ҒЗИ» ЖШС, Қазақстан Республикасы; e-mail: sinyaskiy@list.ru. ORCID: https://orcid.org/0000-0001-6339-6995.

Диляр Нурдунович Туйгунов – Қазақ өңдеу және тамақ өнеркәсібі ҒЗИ ЖШС, Қазақстан Республикасы; e-mail: dilyar117@gmail.com. ORCID: https://orcid.org/0000-0001-5548-6675.

Received 14.01.2024
Revised 29.01.2024
Accepted 30.01.2024

DOI: 10.53360/2788-7995-2024-1(13)-18

МРНТИ: 65.59.31

Д.С. Свидерская[1], А.М. Шуленова[2], Е.Ф. Краснoперова[2*]
[1]Торайгыров университет
140000, Республика Казахстан, г.Павлодар, ул. Ломова, 64
[2]Инновационный Евразийский университет
140000, Республика Казахстан, г.Павлодар, ул.Ломова, 45
*e-mail: kef.80@mail.ru

РАЗРАБОТКА НОВОГО КОЛБАСНОГО ИЗДЕЛИЯ С ПРИМЕНЕНИЕМ НАТУРАЛЬНЫХ ДОБАВОК РАСТИТЕЛЬНОГО ПРОИСХОЖДЕНИЯ

Аннотация: *Статья посвящена перспективам применения натурального растительного сырья в качестве пищевых добавок в мясоперерабатывающей промышленности на примере нового колбасного изделия.*

Необходимость создания таких продуктов возникла в результате сложившейся ситуации с применением огромного количества пищевых добавок искусственного происхождения в производстве мясных продуктов, которые позволяют производителям используя дешевые рецептурные ингредиенты создавать широкий ассортимент продукции более ароматной, более вкусной, внешне более привлекательной, с увеличенным сроком хранения.

Негативное влияние таких добавок на организм человека доказано многочисленными и многолетними исследованиями отечественных и зарубежных ученых. Поэтому для сохранения и поддержания здоровья потребителей необходимо изучать возможности применения различного растительного сырья, которое кроме содержания в большом количестве различных полезных веществ имеют способность проявлять те свойства, благодаря которым применяются искусственные добавки, например усиление вкуса, аромата, подавление патогенной микрофлоры, формирования структуры готового изделия, фиксации окраски и т.п.

В результате проведенных исследований выявлены наиболее перспективные добавки растительного происхождения как розмарин сухой молотый, ягоды черники сухие измельченные, свеклы экстракт жидкий.