



Research Article

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Production of A Mors Drink with A Natural Sweetener



Vera Pozdnyakova¹, Olesya Latysheva², Marina Senchenko^{3*}, Elena Olenchuk⁴ and Irina Belova⁵

¹Head of the department of biotechnology, Russia

²Department of Feed specialist, Russia

³Department of biotechnology, Russia

⁴Department of Veterinary Medicine of associate Russia

⁵Department of Commercial director, Russia

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***Corresponding author:** Marina Senchenko, Department of biotechnology, technological faculty of FSBEI HE Yaroslavl SAA, Yaroslavl, Russia

Summary

Nowadays many countries are actively replacing sugar in the formulations of different products, due to the need to optimize human nutrition, as well as the ability to address the issues of rational nutrition of people with certain diseases. In everyday life, people prefer non-alcoholic beverages because of their ability to cover the body's need for water, quench thirst and ease of use. One of the most preferred non-carbonated non-alcoholic beverages is moors, in the formulation of which sucrose, an undesirable component for people living with certain diseases, such as obesity, diabetes mellitus, etc., is used. The purpose of our research was to study the possibility of using dry stevia leaves [Stevia rebaudiana BERTONI (L.)] (hereinafter stevia) as a sugar substitute and traditional local vegetable raw material in the formulation when producing a moors drink. The results of the evaluation of organoleptic and physico-chemical indicators, the content of macro- and microelements in the moors drink produced from different formulations are presented. In order to use domestic, traditional local vegetable raw material containing a wide range of substances of different pharmacological orientation and in order to adjust organoleptic indicators, additional components of the prescription set (dry peppermint grass, Melissa, organum) were used. The use of traditional local vegetable raw material and a stevia sweetener in the production of a moors drink expands the range of this product in the world industry of non-alcoholic beverages.

Keywords: Non-Alcoholic Beverages; Mors Drink; Sugar Substitute; Formulation; Stevia

Introduction

An important role in maintaining a high level of health and increasing life expectancy belongs to human nutrition. Proper nutrition ensures the normal functioning of the human body, contributes to the prophylaxis of diseases and creates conditions for the prevention of premature aging. The successful solution of the problem of healthy nutrition depends on the development and implementation of the latest technologies of food production using natural vegetable raw material with a high content of biologically active substances, functional ingredients and antioxidants. The human relationship to food as a medicine has created a demand for products known as functional. At present, many countries are actively replacing sugar in the formulations of different products, due to the need to optimize human nutrition, as well as the ability to address the issues of rational nutrition of people with certain diseases. The Institute of Nutrition has repeatedly raised the growing problem of the nutritional status disorder of a person. High blood sugar level leads to the increase of pancreatic

function, reduces the sensitivity of cells to insulin. The modern way of life and nutrition has led to the growth of diseases such as diabetes mellitus. When a person hears about his/her diagnosis, it is sometimes hard to change the preferences for sweet and to refuse to consume favorite food and beverages. Therefore, an urgent solution for people living with certain diseases is to reduce the proportion of sugar in the formulations of food and beverages that are preferred in their daily ration Ivanišová [1], Cheryl [2]. Beverages are the most convenient food, ready to be consumed immediately. In their daily ration people prefer non-alcoholic beverages. The use of carbonated drinks is subjected to comprehensive criticism by scientists around the world because of their harm to human health. One of the most preferred non-carbonated non-alcoholic beverages is moors. However, a variety of non-alcoholic beverages characterized by high sugar content are dominant on the consumer market. Sugar in the composition of moors, kvass, cold black and green tea has a high caloric

content (about 4kcal/g), is quickly absorbed by the body, which leads to a high glucose spike in the body of people living with certain diseases [2]. Thus, the problem of the need to reduce the proportion of sugar in a moors drink, the main directions of which are the use of plant substitutes (for example, stevia), is becoming increasingly acute.

Sativoside is a natural low-calorie sugar substitute, representing the leaf extract of the South American stevia plant. It is 200-300 times higher in sweetness than sugar. Doctors recommend it as the safest sugar substitute, as this sweetener does not increase blood glucose level. Sativoside is used in food industry in the production of bakery and confectionery products, milk-containing products, non-alcoholic, low-alcohol, alcoholic beverages, food concentrates, fruit fillers (fillings, thick spreads, jams), sauces, ketchup, compote, fruit and vegetable drinks, nectars, including the production of food for diabetic patients and baby food for children over three years. In some countries, the use of stevia has become commonplace. In 2018, products and beverages with stevia were registered in many countries, such as Japan, Paraguay and Brazil, USA. In Japan, stevia-derived products contributed to an increase in the life expectancy of the population up to 90 years [2,3]. A promising direction in the creation of the new types of non-alcoholic beverages is the use of traditional local vegetable raw material containing a wide range of substances of different pharmacological orientation, which increase the body tone, adaptive capabilities of the nervous system, the body's resistance to adverse environmental factors, have antioxidant properties due to the wide range of polyphenolic substances in its composition Zhukovskaya [3], Oleynikova [4].

The aim of the research is to study the possibility of using a stevia sweetener and traditional local vegetable raw material in the formulation when producing a moors drink. The objectives of the research are:

- 1) to study the world experience in the development of the industry of non-alcoholic beverages in terms of reducing the sugar content in the formulation and using vegetable raw material
- 2) to develop formulations to produce a moors drink with a natural stevia sweetener and traditional local vegetable raw material
- 3) to develop technological schemes for the production of a

moors drink with a natural stevia sweetener and traditional local vegetable raw material

4) to conduct a trial production of a moors drink with a natural stevia sweetener and traditional local vegetable raw material

5) to determine organoleptic and physico-chemical indicators

6) to determine the content of macro-and microelements.

Materials and Methods

In order to use traditional local vegetable raw material containing a wide range of substances of various pharmacological orientation and to adjust the organoleptic indicators (taste, color; odor) additional components of a prescription set (dry peppermint, Melissa and organum grasses early harvested in 2019) are used. Four objects were selected for the study of organoleptic and physico-chemical indicators: object № 1. Mors drink made according to the traditional technology, which includes sugar, cranberries, water; object № 2. Mors drink made according to the modified technology, which includes sugar, cranberries, water, dry peppermint and Melissa grass; object № 3. Mors drink made according to the modified technology, which includes dry stevia leaves, cranberries, water; object № 4. Mors drink made according to the modified technology, which includes dry stevia leaves, cranberries, water, dry peppermint and Melissa grass.

The paper uses theoretical (analysis) and empirical methods of scientific research (experiments, observation, measurement, comparison, description). The production of the test samples of objects №№ 1, 2, 3 and 4 was carried out on the basis of the Department of Biotechnology of FSBEI of HE Yaroslavl State Agricultural Academy according to the developed formulations and technological schemes. The organoleptic and physico-chemical indicators of all objects of the research were evaluated on the basis of the Department of Biotechnology of FSBEI of HE Yaroslavl State Agricultural Academy: the dry matter content was determined by refractometric method and the acidity by titration. The determination of the macro-and microelements content of the samples was carried out on the basis of Yaroslavl Scientific Research Institute of Livestock Breeding and Forage Production-Federal State Budget Scientific Institution «Federal Williams Research Center of Forage Production and Agroecology» by the atomic absorption spectrometer KVANT-2A (Zn, Cu, Mn, Fe, Mg, Ca were determined by absorption, K-by emission).

Results and Discussion

Table 1: Results of the determination of the organoleptic indicators of the moors drink.

Indicator	Indicator characteristic by GOST 28188-2014	Object №1	Object № 2	Object № 3	Object № 4
Appearance	Transparent liquid without sediment and extraneous inclusions. Opalescence is allowed due to the characteristics of the raw materials used	Transparent liquid without sediment and extraneous inclusions.	Transparent liquid without sediment and extraneous inclusions, with slight opalescence	Transparent liquid without sediment and extraneous inclusions, with slight opalescence	Transparent liquid without sediment and extraneous inclusions, with slight opalescence

Taste and odor	In accordance with the formulations	Sour-sweet, intrinsic to cranberry	Delicate floral odor, sour-sweet, slightly astringent and grassy taste	Sour-sweet, intrinsic to cranberry, slightly grassy	Delicate floral odor, sour-sweet, slightly astringent and grassy taste
Color		Pink	Light brown	Pink	Intense, light brown

In accordance with the methodology developed, the studies of the sweetness intensity of sugar and stevia; the studies on the correction of organoleptic indicators (taste, color, odor) using additional components of the prescription set (dry peppermint and Melissa grass), the development of the formulations of objects 2, 3 and 4 were conducted. The results of the determination of the organoleptic indicators of the moors drink quality are presented in (Table 1). According to the results of the organoleptic analysis, it can be concluded that each of the samples is interesting, each has its own properties, but the resulting blend of sample № 4 had a full bouquet of taste and aromatic characteristics. Physico-chemical parameters meet the requirements of GOST 28188-2014 (within the limit of the calculated indicators in the development of the formulation). The results of the determination of the macro- and microelements content in the moors drink are presented in **Table 2**: Content of macro- and microelements in the moors drink.

(Table 2). The results of the research revealed an increase in the macro- and microelements content in the moors drink prepared according to the modified technology, which includes: stevia (dry stevia leaves produced using our own technology of 2016), cranberry, water, additional ingredients (dry peppermint, Melissa and organum grasses early harvested in 2019). The consumption of a single serving of 237 ml will satisfy the daily recommended allowance of zinc for 1,5%, copper for 2,8%, manganese for 16,1%, iron for 10,6%, potassium for 1,9%, magnesium for 1,2%, calcium for 0,008% for an adult. Unlike the moors drink prepared according to the traditional technology, the moors drink prepared according to the modified technology with the formulation developed by us does not contain sucrose, the glycoside compounds-sativoside, steviolbioside, roadsides A and E, and dulcified give sweetness to the drink.

Macro-/microelement, mg/l	Object №1	Object №2	Recommended daily intake, mg	Content from the recommended daily intake in 100 cm ³ of a drink, %	Content from the recommended daily intake in a single serving (237ml), %
Zn, mg/l	0,13	0,58	10...15	0,58	1,5
Cu, mg/l	-	0,24	2	1,2	2,8
Mn, mg/l	1,62	3,39	5...10	6,78	16,1
Fe, mg/l	2,11	4,49	10...18	4,5	10,6
K, mg/l	22,34	246,95	3000...5000	0,8	1,9
Mg, mg/l	15,34	19,41	400...500	0,5	1,2
Ca, mg/l	0,11	0,18	500...1000	0,004	0,008

Conclusion

The use of cranberries and dry stevia [*Stevia rebaudiana* Bertoni (L.)] leaves has increased the macro- and microelements content in the moors. The use of traditional local vegetable raw material and dry stevia leaves as a sugar substitute in the production of a moors drink expands the range of this product in the domestic and world industry of non-alcoholic beverages.

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