Aspects of Composite Recipes for Candy Glasses Production

Marina G. KURBANOVA

Ph.D. (in Engineering Sciences)

Professor

Department of Agrobiotechnologies

Kuzbass State Agricultural Academy

5, Markovtseva Str., Kemerovo, 650056, Russia

Anastasia Yu. KOLBINA

Postgraduate Student

Department of Agrobiotechnologies

Kuzbass State Agricultural Academy

5, Markovtseva Str., Kemerovo, 650056, Russia

Roman A. VOROSHILIN

Senior Lecturer

Department of Agrobiotechnologies

Kuzbass State Agricultural Academy

5, Markovtseva Str., Kemerovo, 650056, Russia

Lolita R. ASHUROVA

Graduate Student

Department of Agrobiotechnologies

Kuzbass State Agricultural Academy

5, Markovtseva Str., Kemerovo, 650056, Russia

Abstract

Caramel is one of the most promising areas of the food industry, which increases production turnover. The main drawback of which is the low nutritional value, as well as some groups of people with diabetes, are forbidden to eat products containing sugar. Therefore, it is necessary to develop a recipe of caramel with a natural sugar substitute, isomalt, and contains enriching additives: foalfoot, eucalyptus oil and big burdock extract (Zapata et al., 2019). The object of research is experimental samples of functional caramel. The aim of the work was to develop composite mixtures for the recipes of functional candy glasses, with reduced sugar content and

suitable for the prevention of colds. Determined the optimal dosage of additives: 4% of large burdock extract, 1% of eucalyptus oil and 2% of foalfoot using organoleptic and physico-chemical indicators of quality.

Keywords: diabetes diet; isomalt; burdock extract; candy glasses.

Introduction

Healthy diet is based on maintaining a sufficient supply of nutrients in the human body. One of the most widespread and important components that participate in metabolic processes in humans is carbohydrates, namely glucose, which provides plastic functions in the body and ensures normal brain function, which is especially important for people of all ages. Glucose is a compound RNA molecule (Dienel, 2019), which provides hormonal system operation. Maintaining glucose within certain limits is one of the main tasks of the human body, due to the fact that the increase in the level gives a sharp jump in the glucose index (Gangwisch et al., 2020). About 80% of glucose is consumed by the brain; in the state of physiological rest of the body, glucose metabolism intensity is about 2 mg/kg/min (Ohkuma et al., 2020). Stable maintenance of glucose levels is necessary for all metabolic processes in the body. Glucose is considered the main source of energy, which is obtained by glycolysis (Cherkas et al., 2020). Glucose is a key metabolic substrate for energy production in tissues. Normal blood glucose levels are kept within a narrow range by factors that control glucose production and consumption. Key hormones that regulate glucose homeostasis include insulin, glucagon, epinephrine, norepinephrine, and cortisol. Pathological conditions affecting the production or utilization of glucose lead to hypoglycemia (Güemes et al., 2016).

Being the most affordable delicacy for different segments of the population, caramel occupies one of the most promising places in terms of demand and production volumes (Ashurova et al., 2020). Lollipop caramel is mainly a source of simple carbohydrates. However, the composition of composite recipe mixes for its production is not yet ideal and has a number of imperfections, as the traditional formulation is completely absent valuable biologically active substances such as vitamins, lipids and mineral components, including additives that improve the taste. As a result, an actual and promising direction is the development of new formulations with reduced sucrose content and the inclusion of natural biologically active additives in the form of extracts of phytobiotic origin. The production of caramel for functional and preventive purposes has been growing over the last few years, demonstrating stability in growth and demand (Maruyama, De Souza, 2019). Instead of the usual sand sugar natural sugar substitutes - lactite, sorbitol, erythritol, etc. are used, as enriching additives are introduced products of medicinal herbs, mainly in the form of water, alcohol and essential extracts. **The goal of research** was the

development of composite mixtures for recipes of lollipop caramel of functional action, with reduced sugar content and suitable for the prevention of colds.

Methods

The research was conducted at the Department of Agrobiotechnologies using classical methods established by GOST. The experimental samples are made of isomalt, enriching additives: foalfoot extract, eucalyptus oil, large burdock extract. Physico-chemical and organoleptic quality parameters were determined to determine optimal dosages of optimal additives.

Results

Nutrients extracted from plants are used as powders, tablets, extracts, syrups (Gangwisch et al., 2020). A set of positive properties of objects allows you to create recipe compositions that can supply the body more necessary substances.

In the off-season period of the year, when there is an aggravation of colds and respiratory diseases, people use syrups rich in vitamin and mineral complexes, but this form of consumption is not quite acceptable for children and people with rapid pace of life. The common term used for the diagnosis of lung diseases of the upper respiratory tract, which includes a heterogeneous group of self-limiting diseases caused by numerous viruses, is the most common disease in the world. In European countries, each person gets sick from 2 to 5 times a year, in children this figure is twice as high, i.e. 6-12 times a year (Lenoir-Wijnkoop et al., 2015). Colds are seasonal, but the average infection period lasts about 10 days. In addition to the deterioration of the general physical condition of a person, diseases are a burden on the economy of society due to absenteeism at work. In addition, stressful situations are an especially important factor in weakening the body's defenses, which leads to an increased risk of colds. The immune system is a complex network of specialized tissues, organs, cells and chemicals that protect the human body from infectious agents and other harmful effects (Thielmann et al., 2016).

Discussion

Under the new circumstances, with the spread of COVID - 19 and the introduction in many countries of quarantine and restrictions on population movement in the fight against the pandemic, the consumption of vitamins and minerals in the population decreased. Quarantine is associated with a lot of stress and depression, which leads to unhealthy diets and decreased exercise. However, adequate intake of nutrients has been identified as the main weapon in the fight against the virus. Some studies show a positive protective effect when receiving a complete diet of nutrients and increasing physical activity at home and in the fresh air (Headey, Ruel, 2020).

In this regard, the work on the creation of composite prescription mixtures of preventive and functional importance is relevant. For the study, taking into account sugar substitution, formulas with the use of phytobiotic supplements in the form of burdock extract, foalfoot and eucalyptus oil were developed.

During the development of candy glasses recipes, sugar was replaced by isomalt (sugar substitute) which is obtained from sugar beet by hydrogenation of sucrose, and refers to natural products. It is white, water-soluble crystals with a sweetness close to sucrose. Isomaltulose is a disaccharide carbohydrate that is essential for maintaining glycemia and hydration. With an active lifestyle, it is required to carry out recovery processes after training and physiological heat loss (Amano et al., 2019). One of the factors regulating food intake is circulating blood glucose, suggesting that an increase in blood glucose concentration promotes satiety, and low concentrations signal hunger. The World Health Organization estimates that 1.9 billion adults are overweight in 2016. A possible link between circulating glucose concentration and satiety persists with a low glycemic index diet, which contributes to weight control and slower satiety. Glucose is absorbed slowly and interacts with nutrient receptors in the intestine over a long period of time, thereby signaling a long-term stimulus of satiety in the brain (Kendall et al., 2018).

Isomalt in the confectionery industry is widely used in the manufacture of chocolate, grillage, soft caramel and confitures. The basic advantage of an isomalt is presence of polysaccharides that gives dietary properties and thus, in comparison with sugar has a low sweetness factor, only 0.5 c.u. Production of caramel on isomalt has several advantages, which are as follows:

- production of a natural product without artificial flavouring;
- acquisition of functional and preventive orientation;
- analgesic effect.

Isomalt has a low flowability and as a result it has high viscosity. That's why this caramel can be recommended for sore throat and upper respiratory tract, as lollipops are dissolved longer when consumed and have a better effect than when using syrups, sprays, etc.

As a biologically active substances in the composition of caramel lollipops made various doses of burdock root extracts, which have a number of useful properties. The use of burdock extract is necessary for normal life, is used in oncology and is the strongest antioxidant, can cleanse the body of heavy metal salts, binds and removes toxins, radionuclides, reduces blood sugar levels, weight normalization. The extract contains large amounts of iron, vanadium, titanium, strontium,

manganese, zinc and other trace elements. The main element of the extract - inulin, it is used for poisoning and intoxication, treatment of the gastrointestinal tract, infectious and skin diseases.

Foalfoot extract is used in respiratory tract disease, expectorant and anti-inflammatory agent. Coughing has an enveloping effect, helps with bronchial asthma and pneumonia. It should be noted that it is widely used in the absence of appetite and inflammation of the mucous membranes and inflammation of the gastrointestinal tract.

Eucalyptus oil has antiviral, fungicidal, bactericidal and anti-inflammatory effects. The degree of their severity depends on the content of essential oil, which in turn increases the secretion of digestive glands, and improves digestion, stimulates regeneration processes. Eucalyptus has been used as a source of medicinal substances since ancient times. Eucalyptus oil has an important ethnomedical value and is widely used in medicine as an antiseptic and a sedative at the same time (Adnan, 2019, p. 214). In order to give preventive purposes to candy glasses the above-mentioned plants extracts were selected.

For the basis of the recipe in the production of caramel was taken isomalt, the introduction of mother-and-sew and eucalyptus oil did not change in the process of research, and large burdock extract was introduced from 2 to 5% in 0.5 steps.

Organoleptic assessments of quality indices are presented in Table 1.

Table 1. Organoleptic assessments of quality indices

Dosage of enriching additives, g/100g	Quality indices	
	Taste and smell	Color
1	No foreign taste or smell	Light-brown
2	No foreign taste or smell.	Light-brown
3	No foreign taste or smell.	Light-brown
4	Nice herbal smell	Light-brown
5	Bitter taste. Strong herbal smell	Dark-brown

In order to determine the rating of organoleptic quality indices the 30 points scale of confectionery industry was used. The data on the scoring are shown in Figure 1.

Figure 1. Score of organoleptic quality indices

As is evident from the foregoing adding up to 3 g per 100 g of caramel mass does not affect the organoleptic characteristics of caramel quality. It is noted that the addition of 5% of burdock extract has a negative impact on the taste and smell of caramel, so the taste criteria for the optimal dosage of the addition is 4 g per 100 g of caramel mass. In order to determine the possibility of technological use of caramel mass, the caramel mass flowing outward coefficient for 3-4% of the extract was determined. The data are presented in Table 2.

Table 2. Caramel mass flowing outward coefficient

Index	GOST 6477-88	Samples of caramel mass with introduction of additive in quantity, g	
		3	4
Caramel mass flowing outward coefficient, cm ² /g	No more than 1.60	1.25	1.47

As Table 2 shows, the factor of spreading of caramel mass is within the limits established by GOST that testifies to pliability to technological process of half-finished product. In connection with the above quality indices determined the optimal dosage of the introduction of large burdock extract in caramel of isomalt, whose formulation is presented in Table 3.

Table 3. Unified formulation for functional candy glasses

Components	Control
Isomalt	969
Citric acid	5
Large burdock extract	40
Eucalyptus oil	10

Foalfoot extract	20
Total	1044

Conclusion

As a result, the work identified and justified the need to create sugar-free caramel for people with diabetes in order to take care of their health. The main components of the caramel mass is isomaltulose (natural sugar substitute), which does not give a sharp jump in the glycemic blood index. The main enriching additives are determined: large burdock extract, eucalyptus oil, foalfoot extract. On the basis of organoleptic and physico-chemical indices of quality the optimal dosages of burdock extract for a diabetic caramel formulation were determined.

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