

SUGAR IN THE HOSPITALITY INDUSTRY

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Abstract

This study is designed to reveal the role of sugar in the hospitality industry. The purpose of the study is to analyze the range of sugar used in restaurant technologies and develop recommendations for its expansion and application, the creation of a gastronomic brand based on sugar. The subject of the study was the fruits of wild plants: viburnum (*Viburnum opulus*), sea buckthorn (*Hippophae rhamnoides L.*), elderberry (*Sambucus nigra*), mountain ash (*Sorbus aucuparia*) and fortified sugar. It is proposed to enrich sugar with a derivative product of processing wild fruits by the method of osmotic dehydration (sugar solution). It is expedient to use this technology in craft industries. An analytical review of literary sources was carried out, on the basis of which directions for the use of various types of sugar in restaurant technologies were formulated. It has been established that the high cost of imported sugars contributes to an increase in the cost of products with their use. The methodological basis for creating a gastronomic brand was the improvement of approaches to the cultural branding of Ukraine in the international arena by planning the development of “gastronomic tourism” not only as a tourist attraction, but also as a tool for implementing the strategy of public diplomacy. The gastronomic brand “Noble Sugar” was developed on the basis of local raw materials. Directions for the use of fortified sugar in the production of many foods and drinks have been developed, which can be attributed to gastronomic innovations. The presented products are unique and have no analogues in the hospitality industry.

Keywords: fortified sugar, hospitality industry, craft products, gastronomic innovations, gastronomic tourism, restaurant technologies.

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1. Introduction

Granulated sugar is 99.75–99.9 % sucrose and is a product of mass consumption. It is considered an essential food product due to its valuable taste, physical and nutritional properties. This product restores strength and stimulates mental activity. Sugar is used not only as a source of energy, but also as a sweetener and a natural, affordable preservative in the production of many food products [1].

Sugar, an important component of a variety of foods, not only provides them with sweetness, but also plays an important role in shaping their taste, texture and shelf life. At the same time, sugar substitutes have recently been used in the production of food and culinary products [2].

For the production of confectionery, crystalline sugar or syrup from it is used. Sometimes a mixture of various sugars is used to obtain confectionery products with a preferred ratio of amorphous and crystalline composition [3].

For the production of cotton candy and lozenges, syrup with a high concentration of sucrose is rapidly cooled to prevent crystallization [4, 5]. The physical state of sucrose, the main sweetener in caramel, is critical to texture and shelf life [6]. Sucrose has a higher degree of sweetness than glucose, maltose, or higher order saccharides. Therefore, it is most often used for the production of caramel [7].

Most commercially available types of alcoholic beverages are also made using sugar. This is due to the fact that sugar enhances the effect of alcohol, improves its taste [8].

A large number of sugar-containing drinks are produced. Usually, various types of sugars are used for their production, such as brown sugar, corn sweetener, corn syrup, dextrose, fructose, glucose, high fructose corn syrup, honey, lactose, malt syrup, maltose, molasses, raw [9].

It is hard to imagine the absence of sugar in the hospitality industry. Sugar is usually served to guests with coffee or tea. Quite often, restaurateurs try to reflect the concept of the establish-

ment through sugar. The packaging often contains advertisements for the establishment. However, guests are usually offered crystal granulated sugar or pressed white sugar.

In world practice, a new direction is the production of sugar with food additives [10]. It is obtained by enrichment with additives that increase the taste, nutritional, biological and therapeutic value. The Czech Republic [11] produces crystalline sugar “Dortela” flavored with coffee, vanillin and pineapple essence, which can be used in the confectionery industry to make cookies.

Switzerland [12] has developed a method for the production of flavored sugar. The Japanese company Nisin sieto has developed a technology for the production of sugar enriched with minerals [13]. Sugar in the refining process is enriched with minerals, heated, thickened and sterilized.

Some countries produce sugar fortified with vitamin A [14] in order to reduce its deficiency in food. France has developed a technology for colored and flavored sugar containing natural or synthetic extracts of flowers and fruits [15].

The technology of fortifying sugar with vitamin A is very complex and time-consuming [16]. It was proposed to use herbal supplements based on mint, ginger and raspberry as a raw material for sugar enrichment [17]. The authors have shown the results of the sensory evaluation of fortified sugar, its mineral content and energy value, but there is no clarification regarding the method of fortification and the amount of additive.

A technology has been developed for enriching sugar with derivatives of the processing of fruits of wild plants (viburnum, black elderberry, mountain ash, sea buckthorn). The proposed technology makes it possible to obtain a product with high organoleptic properties, but there are no recommendations for the use of such sugar [18].

The analysis showed that sugar is the most important product for the food industry and the hospitality industry. Expanding its range can positively affect the industry as a whole.

The aim of the study is to analyze the range of sugar used in restaurant technologies and develop recommendations for its expansion and application, the creation of a gastronomic brand based on sugar.

To achieve the aim, the following research objectives are defined:

- to analyze the range of sugar used in restaurant development;
- to develop a local gastronomic brand “Noble Sugar”;
- to develop possible uses for fortified sugar.

2. Materials and methods

2.1. Raw materials

The fruits of wild plants: viburnum (*Viburnum opulus*), sea buckthorn (*Hippophae rhamnoides L.*), elderberry (*Sambucus nigra*), mountain ash (*Sorbus aucuparia*) were thoroughly washed and air dried. Prepared fruits were frozen (-18 ± 2 °C) to improve their taste properties, reduce astringency and bitterness. Right before processing, the fruits were defrosted and mixed in a ratio of 1:1 with a 70 % sucrose solution heated to 65 ± 5 °C. Osmotic dehydration of the solution was carried out for 1 hour [19]. After that, the osmotic solution was separated from partially dehydrated fruits and mixed with sugar (10 % by weight of sugar). Enriched sugar was pressed and dried in a laboratory vacuum dryer.

2.2. Research methodology

An analytical review of literary sources was carried out, on the basis of which directions for the use of various types of sugar in restaurant technologies were formulated.

The methodological basis for creating a gastronomic brand is to improve approaches to the cultural branding of Ukraine in the international arena by planning the development of gastronomic tourism not only as a tourist attraction, but as a tool for implementing a public diplomacy strategy. General methods of empirical and theoretical research are used, based on analysis, synthesis, concretization and further generalization of the results obtained in order to determine the role of the “gastronomic brand” as a means of forming national branding in the context of implementing a public strategy, in particular culinary diplomacy of Ukraine.

Scientific novelty lies in the expansion of the range of sugar at the expense of local raw materials with increased biological value. For the first time, the use of a derivative product for the processing of fruits of wild plants (osmotic solution) for sugar enrichment has been proposed.

3. Results

3. 1. Analysis of the range of sugar used in restaurant technology

Most often, sugar is used in restaurant technologies for the preparation of a variety of drinks.

White sugar increases the sweetness of drinks without affecting their taste. The best way to use white sugar in cocktails is to make sugar syrup from it. In this case, it is advisable to use fine-grained sugar, which dissolves faster. Sometimes pressed white sugar is used to make cocktails, such as Old Fashioned. To give additional flavor and aroma properties to cocktails, white sugar is flavored with various ingredients: herbs, spices, berries, fruits or vegetables.

Unlike white sugar, brown sugar contains a certain amount of molasses on the surface of the crystals. This not only gives it its characteristic color, but also increases its biological value due to its high content of calcium, iron and potassium. Such sugar gives a caramel flavor to products that are prepared on its basis. Many consumers prefer brown sugar to coffee. The calorie content of white and brown sugar is practically the same.

Cane sugar also has a brown color (**Fig. 1, a, b**). Refined cane sugar is used to make mojitos and caipirinhas, mixed together with lime slices. Unrefined sugar (**Fig. 1, b**) is more suitable for coffee and tea.

Demerara sugar (**Fig. 2, a**) is made from sugar cane and is less processed than white and brown sugar. It has the same number of calories as brown sugar. Demerara sugar has a pleasant taste of toffee and goes well with dark spirits.

Muscavado sugar is unrefined cane sugar with a moist texture similar to wet sand. It is labeled either light or dark depending on the level of molasses, darker being the most common. Muscavado's flavor profile is much more complex, with a rich molasses flavor. It is bittersweet, with a hint of burnt toffee and caramel.

Turbinado sugar is a partially refined raw sugar that has had some of the molasses removed from the surface of the crystals. Sugar crystals are small. The color of the crystals can be from light golden to brown. One of the famous brands of this sugar is produced in Hawaii [20].

Demerara, Muscovado, and Turbinado sugar can be great additions to rum drinks, Amaro cocktails, or coffee.

Quite often, candy sugar is used to make cocktails, which is made from crystals of different sizes and colors (**Fig. 3**). Such sugar not only gives certain organoleptic characteristics to cocktails, but is a good decoration for them.

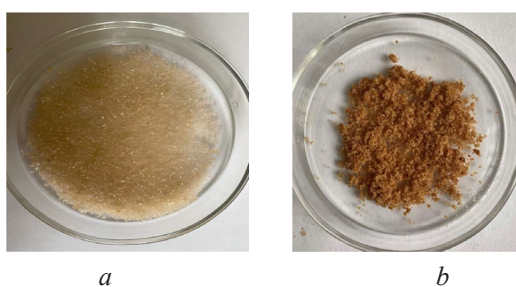


Fig. 1. Cane sugar: *a* – refined; *b* – unrefined

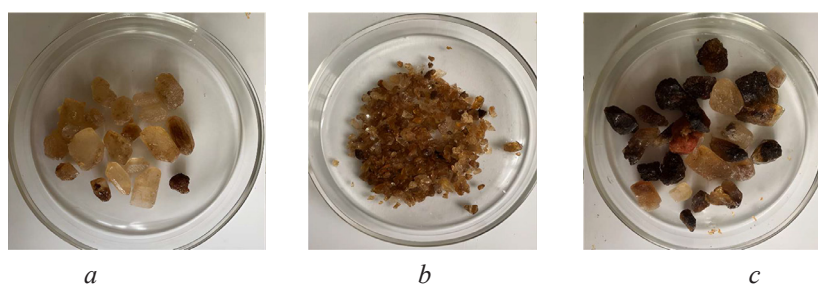


Fig. 2. Cane sugar: *a* – Demerara sugar; *b* – Muscavado sugar; *c* – Turbinado sugar



Fig. 3. Candy sugar



Fig. 4. Lollipop (rock) sugar

Lollipop (rock) sugar (**Fig. 4**) is irregularly shaped single crystals, similar to small lollipops [21]. They are white, brown or golden in color, crystals, translucent and very hard. The technology for the production of rock sugar was invented in China, it consists in multiple recrystallization. Candy sugar is convenient for tea drinking.

The presented types of sugar are not produced in Ukraine, therefore they have a high cost, which affects the cost of products made on their basis.

3. 2. Development of a local gastronomic brand “Noble Sugar”

Sugar is one of the gastronomic business cards of North-Eastern Ukraine. Sugar is a characteristic product of the specified geographical landscape, which in a certain historical section had a mental imprint, shaped the economy and social position of the region. Thanks to world-famous sugar producers, philanthropists Kharitonenko and Tereshchenko, sugar has become a product that is associated with this area. Therefore, it can be considered a traditional product with an ancient history [22]. Today, sugar production is not carried out in this area, however, there are a number of historical evidence of the “sugar period”, such as the “Sugar Monument”, symbolizing the universe, stability and the role of patrons in the development of the city. Recognizing the merits (among other things, financing the construction of the Trinity Church, a real school, St. Zinaida’s hospital, etc.) to the city of the Kharitonenko family. In particular, whose main office of the trading house “Kharitonenko and Son” was located in Sumy, grateful citizens at the end of the 19th century decided to build a monument to the founder of the dynasty of sugar producers and patrons.

The construction of the monument was financed by donations from the townspeople themselves. In 1899, a monument to the philanthropist was erected in the center of Sumy. The sculpture was made of bronze in France. The opening of the monument “Kids with a sweet tooth” is timed to coincide with the 355th anniversary of the city. In 2010, it was built in honor of the Kharitonenko sugar factory family, thanks to its industry, the city flourished in the 19th century. The monument is a copper sculpture of a boy sitting on a chair and being treated to sugar straight from the sack.

Thus, sugar is offered as a gastronomic business card of North-Eastern Ukraine (**Fig. 5**). A technology has been developed that allows expanding the range of sugar, creating a unique innovative product that has no analogues in the world.



Fig. 5. Gastronomic brand “Noble Sugar”

The proposed technology of sugar enrichment [18] is based on waste-free processing of local raw materials, which are typical for Ukraine (viburnum, black elderberry, mountain ash, sea buckthorn). In addition, fruits used for sugar enrichment have a high biological value [23], which gives sugar additional functional properties. In terms of organoleptic characteristics, sugar corresponds to the raw material from which it is made.

A feature of this product is the use of local raw materials, which are expedient to be processed in the conditions of craft production. When getting acquainted with the main historical events and architectural sights of the city, tourists will be able to try a product that can be attributed to gastronomic innovations and products with enhanced functional properties. It is advisable to create a conceptual cafe or restaurant with the arrangement of a mini-museum of sugar production and a store where it is possible to buy fortified sugar and products made on its basis. The gastronomic brand “Noble Sugar” can become a tourist calling card not only for the Sumy region, but also for Ukraine as a whole.

3. 3. Development of applications for fortified sugar

Previous studies have shown that fortified sugar contains amino acids, glucose, fructose, vitamin C, and flavonoids [24, 25].

Enriched sugar is advisable to use not only as a finished product, but also as a raw material for the manufacture of many food products. (**Fig. 6**).

Sugar is used in the production of many sweet drinks (alcoholic and non-alcoholic). The use of sugar with the taste of fruits of wild plants will significantly expand the range of drinks, including Lokavor ones.

Cotton candy and caramel are popular treats among toddlers. Usually, artificial flavoring additives are used in their manufacture. The use of fortified sugar will create a natural-based product with a unique taste.

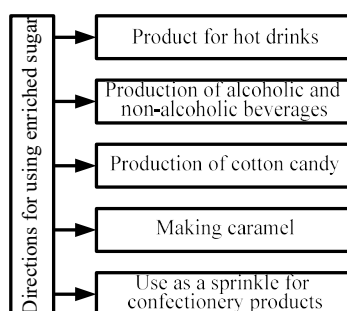


Fig. 6. Applications for fortified sugar

In the formulation of many confectionery products, sprinkling with crystalline white and brown sugar is expected. An excellent analogue can be sugar with the taste of fruit and berry raw materials. Thus, products based on enriched sugars can be classified as gastronomic innovations.

4. Discussion

Presented types of sugar (**Fig. 1–4**), commonly used in the manufacture of drinks, are not produced in Ukraine. They have a high cost, which affects the cost of products made on their basis.

A technology for non-waste processing of fruits is proposed, which includes several mandatory processes: freezing, defrosting, osmotic dehydration, drying, grinding. A solution formed as a result of osmotic dehydration of fruits of wild plants, used to enrich sugar. The resulting product has good consumer properties, contains glucose, fructose, amino acids, vitamin C and flavonoids.

Taking into account the history of the development of North-Eastern Ukraine [22], it is proposed to use sugar as a gastronomic business card of the region. The gastronomic brand “Noble Sugar” was developed.

Possible directions for the use of enriched sugar in the production of food products (**Fig. 6**) such as alcoholic and non-alcoholic drinks, sugar-containing confectionery products, flour confectionery products are proposed.

The problem of introducing this method into craft production may be the difficulty in collecting raw materials and the availability of some auxiliary equipment. For example, an apparatus for osmotic dehydration.

The developed gastronomic brand will reflect only a certain period in the history of the region’s development. The disadvantage of the proposed concept may be that some people do not consume sugar for medical reasons.

In further research, it is planned to develop culinary dishes that can be included in the menu of the «Sugar» conceptual restaurant.

5. Conclusions

The types of sugar commonly used in restaurant technologies for the manufacture of certain types of drinks are analyzed. The high cost of imported sugars increases the cost of products with their use. Given the socio-economic situation of the country, it is advisable to develop beverage recipes based on local raw materials.

The gastronomic brand “Noble Sugars” was developed on the basis of local raw materials. Enrichment of sugar with derivative products of processing of fruits of wild plants is proposed. It is expedient to use this technology within craft industries.

The directions of using fortified sugar in the production of many food products and drinks, which can be attributed to gastronomic innovations, are presented.

Conflict of interest

The authors declare that they have no conflict of interest in relation to this research, whether financial, personal, authorship or otherwise, that could affect the research and its results presented in this paper.

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Data availability

Manuscript has no associated data.

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