

Development of technology for candy caramel with barberry powder and sugar substitute isomaltitol

Oksana Sema¹, Olena Aksonova², Anastasiia Sachko¹, Sergey Gubsky^{2,*}

¹-Department of Chemistry and Food Analysis, Yuriy Fedkovych Chernivtsi National University, Chernivtsi, Ukraine

²-Department of Chemistry, Biochemistry, Microbiology and Hygiene of Nutrition, State Biotechnological University, Kharkiv, Ukraine

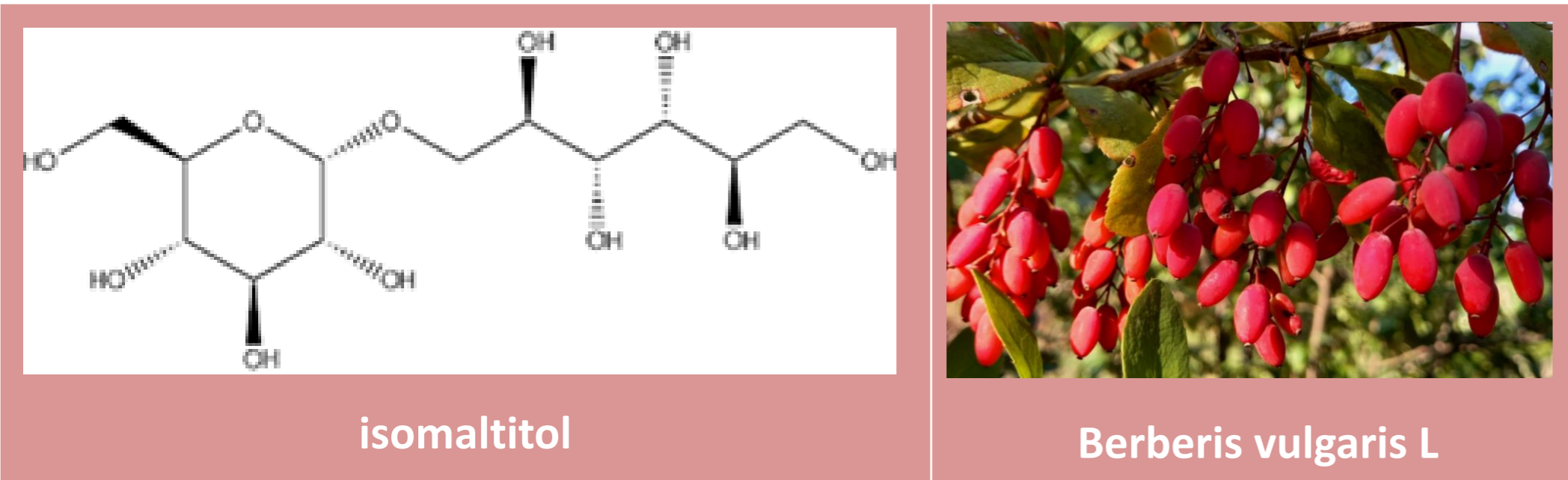
* sergey.m.gubsky@gmail.com

INTRODUCTION & AIM

Wild edible plants contain a significant amount of phenolic compounds, vitamins, glycosides, organic acids, macro- and microelements. They have antioxidant and immunomodulatory properties and have long been used in herbal medicine. These plants include common barberry (*Berberis vulgaris* L.). The addition of barberry powder to confectionery products will completely eliminate artificial colours in the final products and make it possible to obtain products with an attractive appearance and bright colour with high antioxidant potential, increased biological and nutritional value.

Confectionery products and in particular caramel have a low nutritional value and a high glycemic index. Overcoming these shortcomings is possible by including new generation sugar substitutes such as polyols and fortifying agents based on dried vegetable powders in the formulation of lollipop caramel.

The aim of the work is to develop a technology and formulation of candy caramel with the addition of barberry powder as a functional product with a reduced glycemic index based on isomaltitol.



isomaltitol

Berberis vulgaris L

METHOD

Sensory indicators; laser diffraction method (PSA1900, Anton Paar), atomic-absorption spectrometry (C-115 M) with preliminary mineralization (Multiwave 5000, Anton Paar), pH (pH-150M), titration acidity.

Chemical composition of barberry

General information. The presence of anthocyanins in barberry fruit allows it to be used as a natural food colouring instead of synthetic ones, which meets the requirements of consumers to improve food safety.

Mineral composition. Barberry berry powder has been shown to be rich in zinc, sodium and potassium, which will have a beneficial effect on the nutritional properties of caramel (Table 1).

Table 1. Content of some metals in barberry powder samples

Minerals	Barberry powder, mg/100g	Content of mineral, µg, in 1 caramel candy	
		with 1% BP	with 5% BP
Fe	4.2	0.52	2.60
Mn	1.5	0.18	0.90
Zn	24.8	3.10	15.00
Na	248.8	31.00	150.00
K	1536.9	190.00	950.00

Preparation of the powder. Pitted and air-dried barberry berries were ground in an automatic mill and sieved through sieves with a mesh diameter of 0.5 mm. The content of barberry powder in caramel was 1 and 5 % of the total mass of raw materials.

Particles size. The particle size of the additive is also responsible for the sensory characteristics of the finished product. It is generally accepted that it should not exceed 50 microns. The analysis of the volume distribution of particles by size showed that the average particle size of Barberry is 37.4 µm, which is optimal for the production of candy caramel.

RESULTS & DISCUSSION

Candy formulation. Formulation for traditional caramel candy (control) included, g/100g: sugar, 66.0, molasses, 33.2, colorant, 0.1, citric acid, 0.1. Formulation for caramel candy with barberry powder contained, g/100 g: isomaltitol, 77.5, invert syrup, 17.5, and barberry powder, 1, 2.5, 5 and 10 (according to sample). Control caramel candy and caramel candy with barberry powder contained total carbohydrates, g/100 g: 97.5 and 78.36, respectively, and their energetic value, kcal/100 g was: 390 and 313, respectively caramel candy with microelements.

Candy preparation. The isomaltitol and invert syrup were melted to a liquid state, cooled to 70 °C, and dry barberry powder was added. The candy was mixed and moulded.

Sensory evaluation of candy caramel based on isomaltitol and barberry powder is red in colour, non-sticky, regular in shape, has a pleasant caramel smell and a delicate sour note of barberry to taste.



Sensory analysis has shown that the optimal amount of barberry powder to add to a caramel formulation is 2.5-5%. This makes it possible to obtain a final product with an attractive colour and optimal taste characteristics.

Acidity and pH value. It has been shown that the addition of 10% of barberry powder causes a sharp sour taste and a rather dark colour of the final product (Table 2).

Table 2. Acidity and pH of caramel samples

Caramel sample	Titrateable acidity, citric acid equivalent	pH	Humidity, %	Reducing substances, %	ascorbic acid, mg/100 g
Control	0,010	5,090	0,010	0,040	0
With 2,5% barberry	2,752	3,250	0,027	0,0410	0,840

CONCLUSIONS

- The optimum dosage for the candy caramel formulation is from 2.5% to 5% barberry powder. Candies with this content are red in colour, pleasantly sour, with a delicate aroma of barberry berries. This dosage ensures the most even distribution of powder particles in the caramel, compared to the sample with 10% powder.
- With an increase in the amount of Barberry in the composition of candy caramel, the acidity and ascorbic acid content increase. The acidity value is within the normal range 1.02 - 10.2 degrees in terms of citric acid, but the taste and appearance of the candy lose their attractiveness.

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