

TECHNOLOGY OF SEMI-FINISHED PRODUCTS ON THE BASE OF QUINCE FOR WHIPPED SWEET DISHES

*Vasilyeva Elena, Gladkaya Alla

National University of Economics and Trade – Donetsk, Ukraine

*Vasilyeva Elena, vasuleva35@mail.ru

Abstract: Expediency of using fruit of quince in the technology of semi-finished products for sweet whipped dishes with foam structure of high nutritional value was proved in materials of the article. Regularities of the process of acid hydrolysis of cornel semi-finished products in the presence of acidulous puree were determined.

Content of polyphenol composition of different varieties of cornel was learnt, comprehensive quality indexes of semi-finished products were determined.

Key words: functional products, technology, quince, cornel, semi-finished product.

One of the most important conditions for human health, capacity for work, resistance to disease and life expectancy is a well-balanced ultimate nutrition, which includes consumption of biologically active products. Semi-finished products based on fruits and vegetables are the most promising in terms of functional properties and applications in manufacturing foodstuff. Semi-finished products of high readiness are preferable from their diversity, that is purees, pastas, homogenates, juices prefer.

Semi-finished products based on vegetable primary materials are purees of primary materials and they contain a considerable amount of substances useful to a human being, including biologically active ones, in particular vitamins, minerals, dietary fiber, dyes, mono-disaccharides, pectin and inulin –containing substances.

At present level of development of pharmaceutical and food industries, a great importance is given to obtaining natural inulin and oligofructan for its further use as a source of monosaccharides.

One of the sources of plant materials for the production of semi-finished products for the desserts is fruits of quince. Due to the high content of bioactive compounds (polyphenols, vitamins, pectin and mineral substances) quince is recognized as a valuable food of a human being. Among other fruits, quince, first of all, is distinguished with a high content of pectin. Pectins are considered an effective way to treat diabetes. With the technological position, pectins are used as functional and technological ingredients that possess structure-specific properties.

Based on the obtained literature data and a series of earlier experiments, organoleptic evaluation of products such as sour agents of natural origin have been selected, which are soup and puree of black chokeberry and puree of cornel. The choice was due to the chemical composition and properties of plant primary material, content of minerals and vitamins. Fruits of cornel are distinguished with pleasant taste, aroma, presence of nutrients, as well as they are rich in biologically active compounds, due to which cornel has healing properties.

Organoleptic evaluation of various forms of cornel fruits indicates that that they have a sour-sweet taste and pleasant aroma, which depends on the content of essential oils.

Fruits of some varieties (Eugene, Elegant, Yantarnyi, Yelena) have a sweet-sour taste, content of glucose and fructose in them reaches 85- 95% of the total content of sugar.

A large amount of sugar and high acidity from 1.0% to 2.5% makes fruits of cornel a promising material for use in diets. Content of fibers in an average amounts to 1.5 -1.9%, and pectin substances up to 0.8 -1.18%. Fruits of cornel are a source of biologically active substances - bioflavonoids, presented in groups: anthocyanins, catechins, flavonols, and leucoanthocyanins.

We presented a goal of studying the content of polyphenols in varieties of cornel common in Donetsk region. Polyphenolic compounds of cornel are presented with catechins, leucoanthocyanins, anthocyanins, and flavonols. A number of catechins in fruits of different forms varies slightly and it amounts to 282,0-370,0 mg%, except for the variety of Syretsky that contains 188.0 mg%. A number of anthocyanins in fresh cornel fruit amounts to 674% ... 850mg, flavonols 62,5-87,8 mg%. The data is presented in Table 1.

Table 1. Polyphenols of fruits of different varieties of cornel (in-equivalent to primary material, mg%)

Form, variety	Catechins	Flavonols	Leucoanthocyanins	Anthocyanins	
				pulp	skin
Lukyanovskiy	252,0	112	212,0	102,0	707,0
Elegant	310,0	72,0	110,0	102,0	773,0
Syretsky	188,0	87,0	175,0	36,0	802,0
Vydubetsky	82,0	72,5	180,0	110,0	766,0
Eugenia	317,0	75,0	187,0	70,0	766,0

Analyzing the data it is possible to say that the content of leucoanthocyanin in fruits is less than catechins, that is from 112.0 to 212.0 mg%. The greatest number of leucoanthocyanins is contained in the varieties of Lukyanovskaya and Eugene. Flavonols in different varieties of cornel vary from 72.5 mg - 87.0% to 112 mg% in the variety of Lukyanovskaya.

Taste features of cornel are defined by content of carbohydrates, organic acids, tannins, which increase acid. At the same time, other substances and their correlation significantly influence formation of flavor characteristics of cornel fruits.

As a source of non-traditional plant materials, a special attention is drawn to black chokeberry, which is widespread in Ukraine. Black chokeberry is superior to other berries by its economic efficiency. It is resistant to diseases; its fruits are not showered and characterized by high and stable yields.

Fruits of different varieties of black chokeberry have sweet and sour taste due to concentration of organic acids and tannins. Chemical composition of black chokeberry has been studied in detail, with particular attention to vitamin composition of primary materials: vitamin C is 50 - 170mg/100g, vitamin B is 0.02 mg/100 g, vitamin E is 0.5 mg/100 g, carotenoids are 7.5 - 9 ,0 mg/100g. Phenolic compounds with P-vitamin activity is from 2000 to 150 000 mg/100g, tanning substances is 0.3- 0.6%, sugar is 6.2 -10.8%, and organic acids are 0.7 - 1 3%, pectin substances are 0.5 -0.8%. It was established that black chokeberry; due to biologically active substances in its composition have antioxidant and

immunomodulatory effects. Catechins of Black chokeberry bind and excrete radioactive substances from a body, which are metal ions (such as cesium, strontium).

Such a rich composition of bioactive substances makes black chokeberry a promising material for use in the technology of many dishes. Black chokeberry is used in the processing industry; it is used for manufacturing conserve, jam, comfiture, syrup, extract, juice, compote, non-alcoholic drinks, wine, brandy, liqueur, balsam and jelly for the confectionery industry. High medicinal properties and nutritional value explain its use in the manufacture of canned food diet.

In order to study parameters of acid hydrolysis of quince poly-fructans and establish regularities of the process of accumulating fructose, possibility of using natural plant materials has been studied.

As a control, conditions of acid hydrolysis of the quince model system in a 1% solution of citric acid were selected. The process of hydrolysis was controlled by the content of fructose in the mixture. The experimental data are shown in Figure 1.

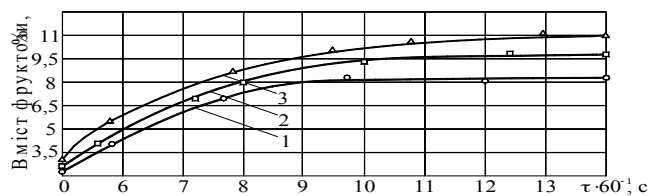


Fig. 1. Effect of herbal additives on the kinetics of hydrolysis of quince poly-fructans: 1 – black chokeberry puree; 2 - cornel puree; 3 - control.

The experimental data evidences that the process of poly-fructans hydrolysis in an medium which is created by acidic agents is different from the process that takes place in aqueous solution with a fixed acidity. It was established that with introduction of black chokeberry puree in the model system it was formed 7.0-8.0% of fructose, and with introduction cornel puree it was formed 9.5-11.0% of fructose.

Thus, it can be stated that presence of organic acids of cornel fruit contributes to intense accumulation of poly-fructans at the quince hydrolysis.

In order to determine optimal conditions for hydrolysis of poly-fructans model system "quince-cornel," we have carried out studies of their acid hydrolysis. The content of cornel puree was 10, 20, 30% from the amount of quince puree. The hydrolysis process was controlled by the content of fructose in the mixture. The experimental data are shown in Figure 2.

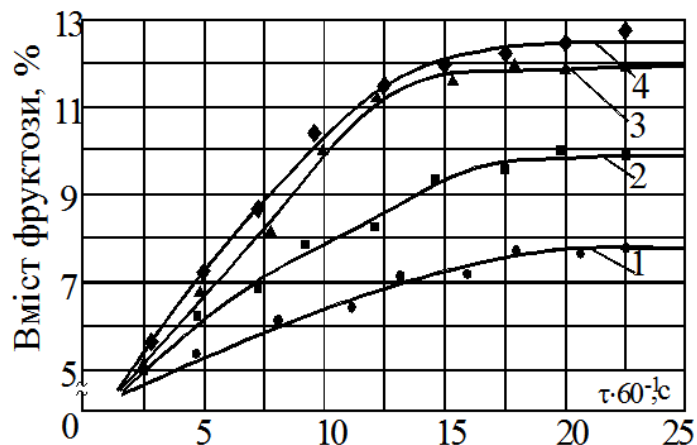


Fig. 2. Effect of cornel puree on the kinetics of hydrolysis of quinces poly-fructans: 1,2,3 - content of cornel puree 10,20,30% respectively, 4 - control.

Thus, from the experimental data we can conclude that with increase of cornel puree amount up to 28.0 - 30%, fructose is the most actively formed in the system.

Optimal parameters of the process of acid hydrolysis of quince poly-fructans are the following: time of hydrolysis is 17 -20 minutes, the acidity of the medium is 3.3-5, temperature is 87 ... 90 C°.

A particular attention should be paid to the fact that when adding cornel puree to the semi-finished product on the base of topinambour in the amount of 28 ... 30%, the product is enriched with food dyes of anthocyanin origin. Presence of anthocyanin pigments in the amount of 220 - 240mg/100g gives a possibility to obtain natural dyes, which have high biological value and nonhazardous for health. Considering the high cost of natural dyes, we believe that we must continue to seek stable and cheap natural dyes of natural origin.

The obtained data allow predicting creation of culinary products with functional load, especially sweet dishes and confectionery, without the use of artificial acidic substances.

Analysis of the existing technological schemes of manufacturing fruit and vegetable purees indicates multi- staging and complexity of the technological process. Taking into consideration that the highly specialized food companies, such as bars, restaurants, cafes, pastry shops, processing of fruit and vegetable primary materials does not conform the technological process, thus creation of semi-finished products based on quince and cornel is expedient.

Semi-finished products based on vegetable primary materials, especially multi-component ones, are complex systems, which are depleted in a variety of chemicals. Under the influence of technological factors, such as blending, heating, grinding, and whipping a variety of chemical processes occur: hydrolysis, fermentation, condensation, oxidation, and reconditioning. Taking into consideration this fact, we deemed it appropriate to learn how to change the organoleptic quality of a semi-finished product based on the quince and cornel, after heat treatment and during storage. The main organoleptic indicators of semi-finished products are shown in Table 1.

Table 1. Organoleptic semi-finished product based on quince and cornel.

Indicators	Characterisric
Appearance, consistency	A homogeneous mass of soft puree, no fibers
Aroma	Pleasant, typical to the used primary materials, free of foreign smell. Aroma of natural cornel fruit.
Taste	Pleasant, sweet and sour
Color	Natural, bright crimson throughout the mass

The derived semi-finished product based on quince and cornel is a creamy, finely divided mass, homogeneous throughout the volume with the pleasant aroma of cornel. The color is bright purple, uniform throughout the mass, the taste is sweet and sour, with the taste of cornel, without foreign flavor, the texture is pasty, and can be easily spread and formed when putting on the surface, and does not flow outward.

Qualimetry methods are widely used for assessing the quality of fruit and vegetable semi-products. We have designed a comprehensive indicator of quality, which reflects the nutritional and biological value, organoleptical, structural - mechanical, and physical - mechanical properties of a semi-finished product based on the quince and cornel. A comprehensive assessment of quality of semi-finished products have shown that the developed semi-finished product has a better quality than its analog in all groups of properties. The overall integrated assessment of quality of the semi-finished product based on the quince and cornel is 7% higher, mainly due to the improved organoleptic and structural and mechanical properties.

Thus, analyzing the obtained data the following conclusions can be drawn:

1. Optimal parameters of acid hydrolysis of quince poly-fructans have been obtained: time of hydrolysis is 17-20 minutes, acidity of the medium is 3.3-5, and temperature is 87 -90C °.
2. Expediency of introducing cornel puree in the amount of 25 - 30%, as an acid agent under acidic hydrolysis have been proved.
3. Biological value and functional properties of cornel makes it use in the technology of hydrolysis expedient.
4. Semi-finished products based on quince and cornel for sweet dishes and confectionery products have high quality indexes.

References

1. Пронина Г.М., Васильева Т.И., Бибилашвили М.А. Технология сладких блюд из плодовых паст и пюре //Проблемы индустриализации общественного питания страны: Тезисы докл. 2-й Всесоюз. науч.конф.- Харьков,1989.- С.142-143.