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Organoleptic and physicochemical properties of juice obtained on the basis of pear pectin

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ABSTRACT: This article substantiates the production of functional drinks based on pectin extract isolated from pear fruits, and presents the effective physiological effect of pectin contained in these drinks on the body, organoleptic indicators and chemical composition of the produced drinks, as well as the nutritional value of pectin extract. It has also been established that the organoleptic indicator of a soft drink prepared on the basis of apple, pear juice and pectin extract is high with a juice to extract ratio of 80:20 and a technological scheme for the production of a cool drink has been developed.

I. INTRODUCTION

The variety of pectin substances allows them to be used in the production of a wide range of food and non-food (therapeutic and prophylactic) products.

Due to the deterioration of the global environmental situation, the creation of soft drinks for the purpose of treatment and prevention is becoming increasingly relevant. Due to the more effective physiological effect of pectin in hydrated form on the body, the importance of producing soft drinks enriched with pectins for the purpose of treatment and prevention is increasing [1, 2].

It is known that pectin extract has the ability to form complexes with heavy and radioactive metals compared to dry pectin solutions, therefore it forms insoluble complexes with various residual substances accumulating in the human body [3].

Pears produce one of the most aromatic juices. At the same time, they are characterized by a high content of pectin and iron and copper additives. The total sugar content in pear juice ranges from 5 to 12%, its acidity is low. Pear juice is transparent and has a sweet taste [4, 5, 6, 7].
Pulp juice is a product made from high-quality fresh fruits, which contains a large amount of not only dissolved extractive substances (sugars, acids, mineral salts), but also insoluble nutrients such as pectin, carotene, flavoring and aromatic substances. is. Therefore, pulp juices completely preserve the natural properties of fresh fruits and are considered to have high nutritional value [8, 9, 10].

II. RESULTS AND DISCUSSION.

We have studied the process of hydrolysis-extraction of pectin substances after the primary preparation of raw materials in order to determine the optimal parameters for developing a technology for extracting pectin from pear pomace for food purposes.

Hydrolysis of the protopectin complex includes two stages: the joining of protopectin macromolecular chains with other components of the cell walls and the hydrolysis of protopectin polymer chains, the formation of hydrolysis products with different molecular weights and solubility in water.

The main indicators influencing the process of hydrolysis-extraction of pectin substances are the concentration of hydrogen ions in the extractant, temperature and duration of the process.

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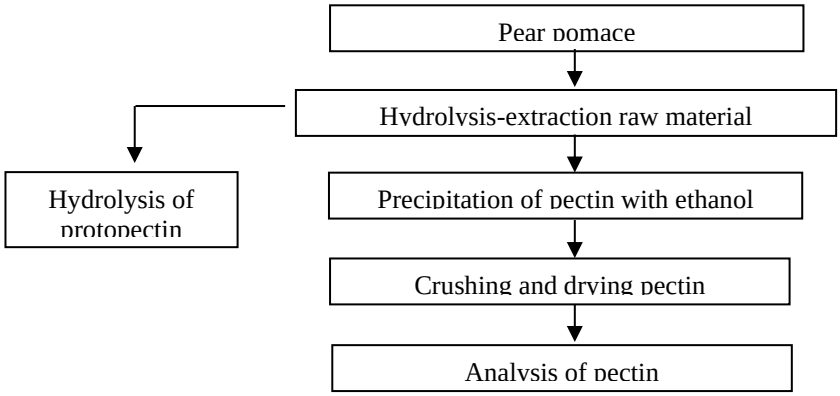
Extraction of pectin substances from pear pomace was carried out according to the scheme presented in Scheme 1.



Scheme 1. Scheme of the main processes occurring during the extraction of pectin substances from pear pomace.

Taking into account the consumption rates of juices, we have developed drinks with the addition of pear pectin extract.

Pectins added to juice improve its organoleptic properties, preserve aromas and create a sense of taste harmony. For this purpose, we conducted research to study changes in the organoleptic properties of drinks when local fruit juices and pectin extracts are present in different concentrations, as well as to determine the optimal ratio of local fruit juices and pectin substances for developing a recipe for drinks containing pectin.

When choosing a combination of juice and pectin extract for making drinks, their organoleptic properties were chosen as the main criteria. In addition, we took into account the consistency of the finished juice, because the organoleptic properties of the drink depend on it. Also, when producing dark juices with fruit pulp, it is necessary to use stabilizing additives (stabilizers).

When developing the optimal combination, the presence of pectin in juices together with the fruit pulp as a stabilizing additive was also taken into account.

When using pectin extract as a source of pectin, the formation of a stable system is accelerated.

Experimental data on determining the optimal concentration of pectin substances are presented in Table 1.

Table 1. Effect of the amount of pectin extract on the organoleptic properties of the drink.

№	**Drink**	**Evaluation of a drink with different concentrations of pectin extract on a 10-point scale**			
		ratio of fruit juice and pectin extract, %			
		80/20	*60/40*	*40/60*	*20/80*
1.	Apple juice	10	10	6	3
2.	Pear juice	10	9	5	2

To determine the ratio of fruit juice and pectin extract required to produce the drink, the study was conducted in 4 stages:

1) the drink contains fruit juice - 80%, pectin extract - 20% by volume;
2) fruit juice in the drink - 60%, pectin extract - 40% by volume;
3) fruit juice in the drink - 40%, pectin extract - 60% by volume;
4) fruit juice in the drink - 20%, pectin extract - 80% by volume.

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The results of the experiment showed that with a percentage content of pectin extract in a drink made from apple and pear juice of 20 and 40%, the organoleptic properties of the drink are high.

A further increase in the dosage of pectin extract undoubtedly increases the functional and organoleptic properties of these drinks. However, this is economically undesirable, since it leads to an increase in the price of the finished pectin-containing drink. The harmonious taste of the drink is achieved due to the optimal combination of components according to the recipe, which include sugar and acid.

Sugar added to the drink not only gives a sweet taste, but also helps to absorb the aromatic substances contained in juices. Adding acid determines the harmony of taste. In our experiments, we used citric acid. Organoleptic indicators of the produced drinks are presented in Table 2.

Table 2. Organoleptic characteristics of produced beverages.

Indicators	Properties of functional drinks	
	Apple juice with pear pectin extract	Pear juice with pear pectin extract
Appearance and color	The color of the fruit from which the juice is made. Transparent	Suspended particles present, light yellow color. Transparent
Taste and smell	Natural, aromatic, well-defined apple flavor. Has a pleasant sweet, slightly sour taste. No foreign tastes or odors	Aromatic, well-defined pear flavor. Has a pleasant sweet and sour, slightly sour taste. No foreign tastes or smells
Consistency	Typical of freshly squeezed fruit juices. There is sediment at the bottom of the bowl	An evenly distributed suspension of fine pulp. Sediment remains at the bottom of the bowl
Foreign impurities	No	No

The chemical composition of the produced drinks is presented in Table 3.

As can be seen from the table, pear juice varies in the amount of pectin substances and others.

Table 3. Chemical composition of the developed drinks

№	Type	Pectin substances, %	Vitamin C, mg %	Thiamine mcg, %	Carotene, mcg %	Tannous substances,%	Zn, mg/kg
1.	Pear juice – pear pectin	1.02	0.8	2.2	0.6	0.75	0.25
2.	Apple juice - pear pectin	0.85	0.9	0.2	0.5	0.12	0.38

The minerals in the drink are important for functional nutrition. We found that the zinc content was highest in the pear juice-pear pectin based drink.

Pulp juice is a product made from high-quality fresh fruits, containing not only soluble extractive substances (sugars, acids, mineral salts), but also most of the useful insoluble substances (pectins, carotene, tannins and aromatic substances). Therefore, pulp juices completely preserve the natural properties of fresh fruits and have high nutritional value.

Recommended juices are prepared from fresh fruits with the addition of pectin extract of pear pulp.

The technology for obtaining pectin drinks is as follows. Raw materials from boxes are fed into washing machines using a conveyor. After preliminary washing of fruits with water, they are sent to a transport conveyor for inspection (removal of rotten, moldy and other fruits unsuitable for processing). Washed, sorted and checked fruits are crushed to a size of 3-6 mm. Crushed or ground fruits are heated in screw heaters to soften the pulp.

The crushed mass of apples and pears is heated to 90-95°C. Heating is carried out with live steam. Before sending the crushed mass to the filter-centrifuge, the fruits are heated during the crushing process at a temperature of 90-95°C for 16-30 seconds, for this purpose live steam is fed into the crusher and into the screw feeder.

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Juice should be squeezed immediately after the fruit is prepared. It should be remembered that in order for the juice to be of excellent quality, the processes of crushing, heating and extracting the juice should be carried out continuously. Natural juices are obtained in continuous centrifuges or extractors of the 2P8-1M type. When extracting juice in filter centrifuges, the rotors should be equipped with sieves with round holes of 0.06-0.10 mm in diameter.

The amount of pulp in the juice obtained in the centrifuge is controlled by passing it through a processing device with sieves with standardized holes. To prevent the juice from bubbling, hot steam is supplied to the finisher.

The prepared components (fruit juice and pear pectin extract) are mixed according to the recipe. The mixture is thoroughly stirred for 5 minutes and heated to 60°C. After mixing, the juice is homogenized. Homogenization of fruit juice is carried out under a pressure of 15-17 MPa. Homogenized juice is deaerated at a temperature of 35-40 °C and a residual pressure of 6-8 kPa. The duration of deaeration should not exceed 10 minutes. After this, the juice is heated to a temperature of 70-80°C.

The pasteurized product is sent for bottling. The department has TBL-19 and TBA-21 bottling machines that form 0.2-liter packages. These two machines form the packaging container and fill it with pasteurized juice. Before bottling, the package is passed through a bath with hydrogen peroxide. Then the box is dried with hot air and sealed with foil, while holes are punched and a constant flow of juice from the pasteurizer is provided here. After filling the containers, their necks are closed and transferred to the packaging machines by conveyor. The packaging machine collects the juice boxes and packs them in polyethylene film. The boxes are placed on pallets and sent to the warehouse.

The technological scheme for the production of fruit juices with the addition of pear pectin extract is presented in fig. 1.

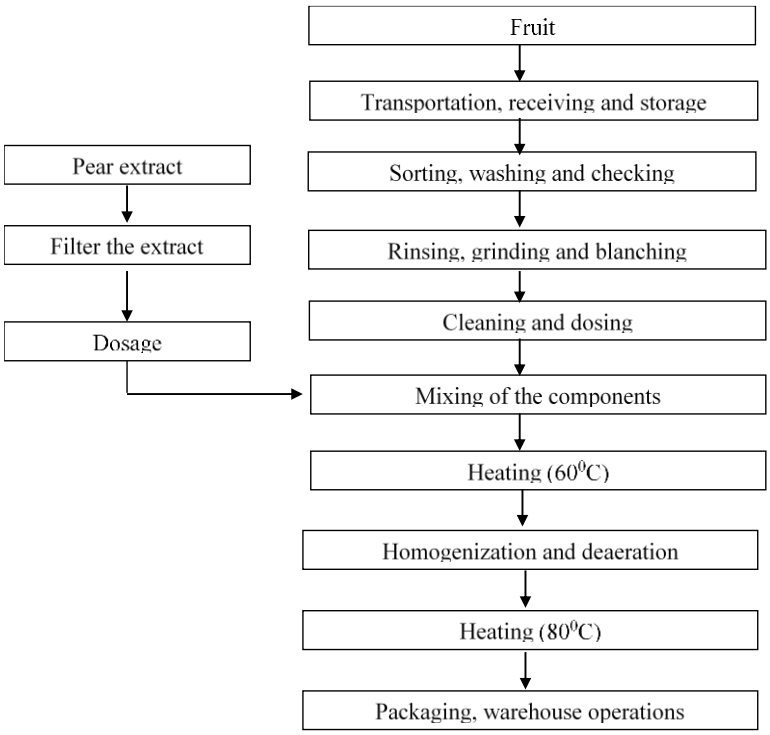

Figure 1. Technological scheme of production of juice with added pear pectin extract.

Quality indicators of apple and pear juices with added pear pectin extract are presented in Tables 4, 5.

ISSN: 2350-0328
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Table 4. Physicochemical parameters of apple juice produced with the addition of pear pectin extract

Indicators	Amount
Carbohydrates, %	11,6
Titratable acidity (by malic acid), %	0,8
Mass percentage of dry matter, not less than %	13,5
Mass fraction of pulp, %	30
pH	4,3
Mass percentage of pectin substances, %	1,2
Energy value, kcal	47,6

Table 5. Physicochemical parameters of pear juice developed with the addition of pear pectin extract

Indicators	Amount
Carbohydrates, %	12,8
Titratable acidity (by malic acid), %	0,5
Mass percentage of dry matter, not less than %	12,9
Mass fraction of pulp, %	30
pH	4,7
Mass percentage of pectin substances, %	1,0
Energy value, kcal	52,5

According to organoleptic indicators, juices obtained with pulp have evenly distributed fine pulp and a pleasant aroma, characteristic of these fruits acteristic of these fruits.

III. CONCLUSION

In conclusion, it should be said that the obtained functional drink based on pectin extract is suitable for consumption due to its organoleptic properties, including good appearance, color, taste, smell and consistency. Based on this content, it is recommended to produce functional drinks used as a preventive measure for workers working with heavy and radioactive metals.

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