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NATURAL SUGAR-CONTAINING CONCENTRATE FROM MELON FRUIT

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ABSTRACT
It is known that, currently sugar is obtained from sugar beets or sugar cane. The need for sugar in our republic is more than 500 thousand tons per year, this includes both consumption by the private sector and industrial consumption. The lion's share of this amount is imported from Russia, Ukraine, Kazakhstan, and others. There are no own sugar factories in Uzbekistan, with the exception of Khorezm, which refuses cane yellow sugar coming from Iran [1].

KEYWORDS: melon, variety, pulp, sugar content, juice, technology, rubbing, cleaning, decantation, evaporation, syrup, honey, concentration.

INTRODUCTION

The technology for producing sugar from sugar beets is a rather complicated production where are used milk of lime, sulfuric acid, carbon dioxide, a lot of water, heating steam and more than 90 types of sophisticated heating equipment. To obtain these components, it is necessary to build additional production facilities: a lime plant, a beet pulp processing plant, a distillery, powerful boiler rooms and water treatment systems.
In addition, sugar beet is a water-consuming plant and in Uzbekistan, where there is a large shortage of water irrigation, the expected yield does not exceed 250 c / h (for comparison, in Ukraine and central Russia it reaches 600-620 c / h). The sugar yield from sugar beets is 11 ... 12% or (2.4 ... 2.6 t / h).
With proper agricultural techniques for cultivating melon fruits on medium-saline soils, the yield will be no lower than 350-400 c / h, and the total sugar content for some central Asian varieties is 9 ... 18% [2]. Therefore, the high-sugar melon fruit is an alternative source of sugar-containing concentrates used in the food industry.

METHODS

In laboratory conditions, we obtained a sugar-containing concentrate from melon fruits. For the experiments, “ak-kavun” melons with an average sugar content of 8-10% and “shakarpalak” with a total sugar content of 9-14% were selected. For this, the fruits were peeled, the placenta with seeds was removed, and the pulp was separated. All components were weighed and entered into the data table. Then the pulp was crushed on a blender, heated, the resulting pulp was used to inactivate the enzymes, filtered to obtain a coarse filtrate, decanted with a bentonite solution, colloidal sediments were removed in a laboratory centrifuge. The resulting filtered juice was treated with ku-2 resin and again filtered through paper towels. The clarified juice was concentrated in vacuo on a laboratory evaporation rotor to a solids content of 68-70%.
The resulting dense syrupy mass of melon honey has a straw yellow color, sweet taste with a specific melon odor. The qualitative composition of the syrup was determined in a paper chromatogram. The following were used for research system: n-butanol-water-acetic acid in a ratio of 4: 1: 5 and n-butanol-pyridine-water in a ratio of 6: 4: 3. Fn-1 was taken as filter paper. The analysis showed that the sucrose content is 70-75%, a small amount of free monosaccharaides and fruit-containing oligosaccharides.

EXPERIMENT

The biochemical composition of the melon pulp is shown in table 1, and in table 2, a comparative assessment of the "ok-kavun" and "shakarpalak" melon concentrates

Table 1.
The biochemical composition of the melon pulp per 100g.

Pulp structure, g	**Vitamins, mg**	**Microelements, mg**
Water :90,0	A:0,4	Kalium:118,0
Protein :0,6	B1:0,04	Calcium:16,0
Fat:0,3	B2:0,04	Magnesium:13,0
Carbohydrate:7,4	B3:0,2	Natrium:32,0
No saturated fat of acid:7,3	B6:0,06	Sulfur:10,0
Mono- and disaccharide:7,3	B9:6,0	Phosphorus:12,0
Starch:0,1	C:20,0	Manganese:35,0
Food fiber :0,9	E:0,1	Copper:47,0
Organic acids:0,2	PP:0,4	Fluorine:20,0
Pectin elements:0,01	Ash:0,6	Zinc:90,0

Note: calories 3200-3290 cal.

Table 2.
Comparative evaluation of the processing of pulp of melon fruit "Ok-kavun" and "Shakarpalak"

Melon varieties	Structural components, g							Copper concentrate,%
	Total weight	Peel	Pulp	Seed	Juice	Bagasse	Concentrate	
Ok-kavun	8600	1460	6450	690	5800	650	520	68
Shakarpalak	4400	660	3420	320	3080	340	300	70

Based on the analysis of laboratory studies, we can conclude that both summer and summer-autumn high-sugar melon varieties are suitable for the production of melon honey. The content of total sugars in them is on average 9-18.1%, non-sugars (dumpling, hemicellulose) 1.0-1.5%. These varieties include kinds acceptable for industrial processing: Ak-Urug, Obi-Navvat, Kucca, Gulyabi orange, Ala-puchak, Krasnomyasnaya, Koktinni, etc. [3]. Calculations showed that from 1t of fresh fruits you can get 65-70 kg of melon honey, which is an alternative, sucrose substitute used in the confectionery and food industries.
In this regard, we have developed a principled hardware-technological scheme (HTS) of melon honey production technology, shown in Fig. 1.

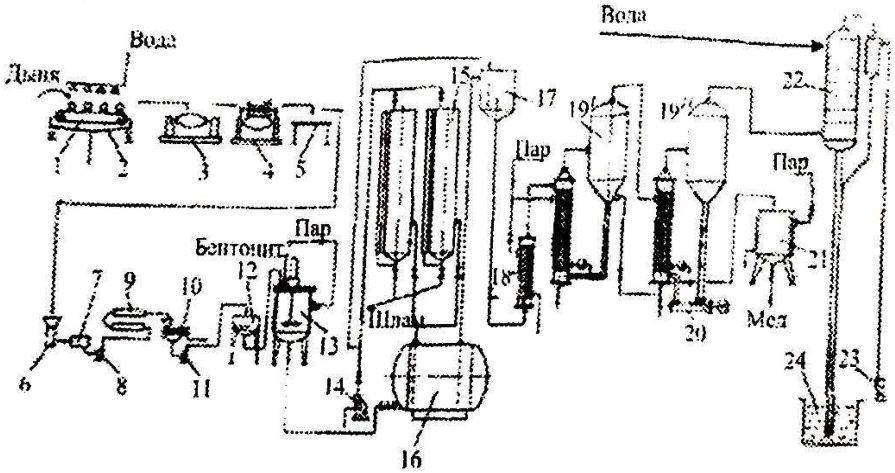

Fig. 1 Principled hardware-technological scheme (ATS) of melon honey production technology:

1-roller conveyor; 2-bath; 3-machine for removing peel from the fruit of the melon; 4-apparatus for cutting the fruit of a melon into slices; 5-cutting table; 6-chopper A9-KB; 7-wipe; 8-piston pump; 9 shell-and-tube sterilizer; 10-screw press; 11-centrifugal pump; 12-inch filter; 13 reactor with a frame stirrer; 14-pump; 15-decanter; 16-collection of clarified work; 17-pressure tank; 18-shell and tube heat exchanger; 19^1-first body of the evaporator; 19^2 -second housing; 20-pump circulation screw; 21-collection of finished products; 22-barometric capacitor; 23-ring vacuum pump; 24-barometric pit.

We will consider the basic operations that must be carried out in the production of melon honey.

Primary processing. The following operations are included in this: washing and sorting; peeling, cutting the peeled fruit into ring slices, removing placenta seeds and chopping the pulp. For washing melons, you can adapt the washer A9-KMB-8. Sorting and inspection is carried out on a roller conveyor.

Removing the peel and cutting the fetus into wedges is carried out on mechanized units developed by a group of designers and authors.

Separation of seeds with placentas is done manually. The peeled pulp slices are crushed on KOS type crushers or on the A9-KV vegetable cutter. The resulting crushed pulp mass is passed through a wiper with a sieve diameter of 1.2 mm. with obtaining rough pulp.

Heated pulp. Pressing method is used to extract the juice. In our case, the modernized screw press PShM-250 is used with a gap of 0.5 mm in the grain chamber. Juice output is regulated by the gap between the moving gate and the cylinder body.

Lightening the juice. Squeezed by pressing juice is a polydisperse system and contains not only juice, but also microscopic particles of fruit pulp and fiber.

To obtain a pure product, it must be divided into suspensions; it can be removed by passing juice through a stainless steel sieve with a whole diameter of 0.75 mm or on a suction filter.

To obtain a clear juice, it is treated with a solution of bentonite. In this case, the stability of the colloidal system, which includes part of the protein and pectin substances, is violated. For this purpose, decanters are used, a kind of vertical vessels with a small diameter, in which the suspension is maintained until completely separated into sediment and a light liquid.

As a result, the clarified juice formed is pumped to the evaporation station, and the sludge is removed.

Evaporation. The purpose of this process is to thicken the juice and bring the solids content to 65-75%. Evaporation of the juice is carried out in double-shell vacuum-evaporation plants at a temperature of 55-56 0C, which prevents caramelization of sugars. The final product is a clear, straw-yellow, viscous honey-like solution. The resulting concentrated juice is packaged in containers at a temperature of 40-50 ° C and is used as a sugar substitute in the confectionery industry.

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