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Analytical Analysis of Pomegranate Fruit Juice Processing Technology in Uzbekistan and Increase of EMM Energy Effect Duration, Its Chemical and Organoleptic Indicators

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Abstract: In this article, the chemical composition of pomegranate juice was examined using ultraviolet and infrared radiation to obtain additional information on the characteristics of electroflotation processes. improvement of working technology and improvement of the quality of produced pomegranate juice is based on the application of electrophysical methods.

Keywords: pomegranate, processing, export, processes, improvement, assortment, juice, high frequency, electromagnetic field, electrophysical.

The results of analysis in electroflotation cleaning current density (experiment series 1) 15 мА/см^2 and 50 мА/см^2 (experiment series 1) are presented. (Table 6). As can be seen from the data, there are no significant changes in the parameters of pomegranate juice. In the process of electroflotation, there are no significant changes in dry matter, sugar, titrated acid, clay and binding substances, iron, calcium and vitamins.

In order to obtain additional information on the characteristics of electroflotation processes, the chemical composition of pomegranate juice was investigated using ultraviolet and infrared radiation.

Table 1. Chemical composition of pomegranate juice before (1) and after (2) electroflotation

Experiment series	Sample number	Height of sorted samples, cm	Dry matter, %	Sugar,%	Titrated acid %	Doubly and decorative substances, g/l	Acidity, %	pH	Fe, мг/ 100 г	Ca мг/ 100 г.	Vitamins, мг %.			
											Ascorbic acid -C pH 5,0	Thiamine –B_1, мг% pH 7,5,	Riboflavin	pyridoxine
1	1	0	21,0	18,5	1,29	1,12	1,8	3,35	0,15	0,22	12	0,22	0,15	0,4
	2	70	21,0	18,6	1,29	1,11	1,8	3,35	0,15	0,22	11	0,22	0,15	0,4
	3	0	21,0	18,3	1,29	1,12	1,8	3,35	0,14	0,21	10	0,22	0,15	0,4
	4	20	21,0	18,3	1,29	1,11	1,9	3,3	0,14	0,21	11	0,21	0,14	0,4
	5	60	21,0	18,6	1,29	1,12	1,6	3,3	0,14	0,21	10	0,21	0,15	0,4
	6	70	21,0	18,3	1,29	1,08	1,6	3,3	0,15	0,22	10	0,21	0,14	0,4
2	1	0	18,6	16.6	1,26	1,09	1,5	3,4	0,14	0,21	9	0,21	0,13	0,3
	2	70	18,2	16,3	1,24	1,06	1,4	3,4	0,14	0,22	8	0,20	0,13	0,3
	3	0	18,4	16,3	1,24	1,05	1,5	3,4	0,13	0,21	8	0,19	0,14	0,3
	4	20	18,4	16,3	1,25	1,05	1,3	3,4	0,14	0,21	8	0,20	0,13	0,3
	5	60	18,4	16,3	1,24	1,04	1,3	3,4	0,13	0,21	7	0,19	0,13	0,3
	6	70	18,4	16,3	1,24	1,03	1,2	3,35	0,14	0,22	8	0,20	0,14	0,3

or this, a SF 4 type quartz spectrophotometer was used in the range of 220 to 1100 μm. In this range, the maximum absorption was found in the ultraviolet part of the spectrum. The conducted organoleptic analysis confirmed that clarity, color and taste of pomegranate juice improved in electroflotation.

The production line was improved with the use of a two-chamber combined electroflotation device instead of the plate heat exchanger pasteurizer in the existing "Bertutsci" production line, and instead of the O'YuCh resonant pasteurizer, and the second separator used at the post-purification stage of pomegranate (Fig. 1).

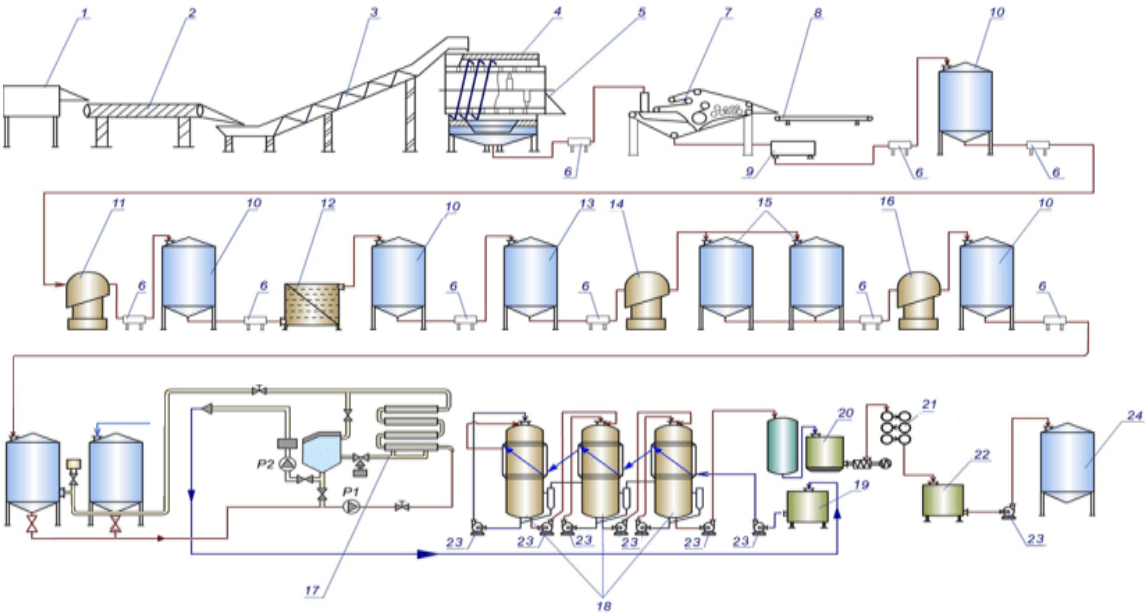

Figure 1. Improved technological line for the production of pomegranate juice and concentrate

1 reception desk; 2nd transporter; 3-washing elevator; 4 piece sorting machine ("Bertuzzi"); 5-pomegranate transporter; 6th pump; 7 tape press ("Flottweg"); 8-pomegranate seed transporter; 9-juice buffer capacity; 10th juice collecting reservoir; 11th separator ("Nagema"); 12-PC pasteurizer; 13-anion exchange reactor; 14-anionite separation separator; 15-fermentation-gluing tank (tannase); 16-Two-section electroflotation device; 17-ultrafilter device "Unipectin AG", BS17-ultrafilter juice tank-17; BD17-ultrafilter distillate tank-17; 18-three-body vacuum-evaporation device "Chema"; 19-juice buffer capacity; Capacity for 20 ready-made concentrates; Salt cooler for concentrate 21; 22-cooled concentrate collection capacity; 23-vacuum pump; 24-aseptic tank.

The principle technological scheme of O'YuCh continuous pasteurizer and two-chamber electroflotation device for pomegranate juice is presented in Figures 4, 3.

The UU pasteurizer is composed of the UU EMM energy source, UUu pasteurizer management, safety equipment, and juice inlet and outlet pipes. Pasteurizers are divided into three groups by power: small (up to 1.5 kW), medium (1.5-5 kW) and large (greater than 5 kW), and by productivity: small (5-10 kg/s), medium (15 -40 kg/s) and can be large (more than 50 kg/s).

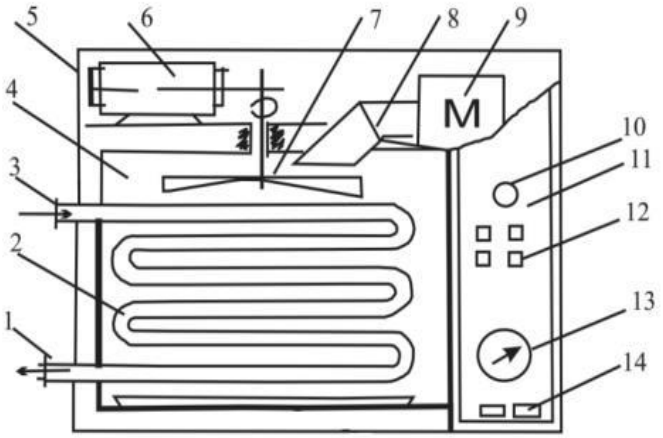

Figure 2. Principle technological scheme of the device for continuous pasteurization of O'YuCh pomegranate juice.

1 and 3 juice outlet and inlet pipes; 2 continuous juice pasteurization serpentine pipes in working chamber; 4-resonator PC working chamber; 5. the frame of the device; 6-dissector electric motor; 7th dissector; 8–EMM wave transmitter; 9-magnetron; 10-signal lamp; 11-control panel; 12-control panel buttons; 13-rheostat; 14–device on/off button.

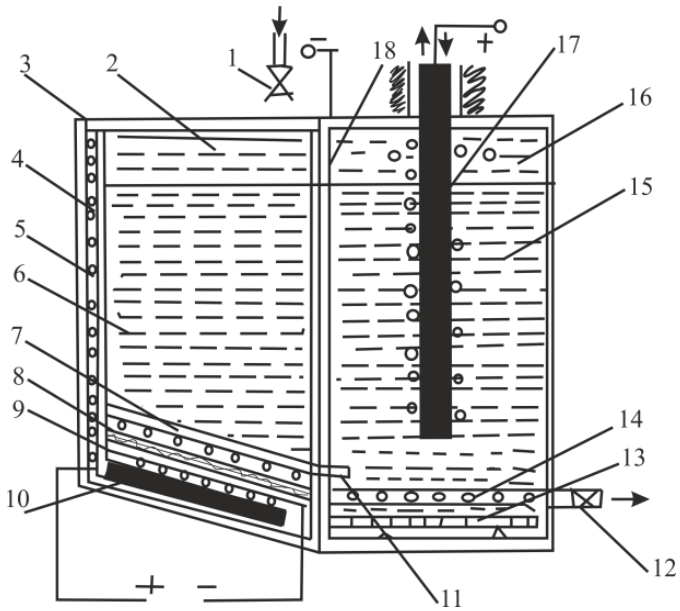

Figure 3. Two-chamber pomegranate juice electroflotation device.

1st juice inlet; 2-foam product; 3rd frame; 4th oxygen outlet; 5-oxygen bubbles; 6-processing juice; 7-pure juice outlet; 8th diaphragm; 9th cathode; 10,17-anode; 11th juice transition to the second section; 12-pure juice outlet; 13th cathode; 14 hydrogen bubbles coming out of the cathode; 15-quality purified juice; 16th foam layer; 18-cathode wire

The electroflotation device consists of anode and cathode electrodes installed in the working chamber, product supply, output, DC power source, control system and other parts. In its two chambers: first, large wastes of pomegranate juice are purified in a flow of rapid bubbles, allowing mixing of the flows, and then in a slow flow without allowing mixing, attaching small colloidal particles to the bubbles.

In the work, the engineering calculation method of O'YuCh pasteurizer and electroflotation devices is presented. In it, it is proposed to use the following formula for the calculation of the pasteurizer working chamber with O'YuCh resonator:

$$z_f = \frac{r\bar{\vartheta}\rho C_\rho}{2(\beta-\alpha r\bar{\vartheta}\rho C_\rho)} \ln\left\{\frac{\beta}{\alpha r\bar{\vartheta}\rho C}\left[\frac{[(T_n-T_b)+r\Delta U\rho\cdot r](\beta-dr\bar{\vartheta}\rho C)}{2\alpha\beta P_{\Delta y} r}+1\right]\right\} \qquad (1)$$

zf-length of working chamber m; T-ambient temperature ^{0}C; The limit of temperature change from T_n to t_s is ^{0}C; Product throughput rate from ΔU -chamber.

The length L and height H of the working chamber at the expense of electrolocation are taken as constant, and the following formula is used for its width-K, G-efficiency:

$$K = \frac{4GH_0 \imath n\rho_0 \cos\frac{\pi}{2} S_k}{\pi^2 S_k^2 LR} \qquad (2)$$

S_k -device cross-sectional area, м^2; ; $\imath n\rho_0$--juice mass and density кг/м^3

The economic benefit from the introduction of these developments into production amounted to 647.6 million soms per year.

CONCLUSION

Effectiveness of using O'YuCh EMM energy in stopping the activity of microorganisms during pasteurization of pomegranate juice is substantiated. It was determined that the survival of microorganisms depends on the dielectric properties, the concentration of the living medium, the frequency and power of EMM, and the smallness of the dielectric permittivity. The complex dielectric permittivity ε' = 53,8-61,3 during the processing of the juice of local pomegranate varieties under the influence of an electric field at f=2300 mHz t=20 ^{0}C. 3 and ε''=14,3-17,2 were determined. In the purification of pomegranate juice by electroflotation: the effect of current density on the process, placement of electrodes in the chamber, properties of foaming, juice temperature and layer height was determined. When the temperature of pomegranate juice is 45-50 0C, the optimal mode of juice purification was determined at a current density of 15·20 mA/cm2. However, it was proved that 1-1.5% curd can be formed in this method. During the electroflotation process, the physico-chemical parameters of pomegranate juice: dry matter, sugar, dubious and coloring matter, acid, iron, calcium, and vitamins do not change significantly. improved taste was confirmed. A two-chamber combined electroflotation device for continuous pasteurization of pomegranate juice was developed. The technology of production of pomegranate juice and concentrate was improved. Engineering calculations of pasteurization and electroflotation devices were presented. It was determined that the expected economic effect of production is 647.6 million soums.

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