ELECTRO TECHNOLOGY FOR INCREASING ENERGETIC EFFICIENCY IN COTTONSEED

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Abstract. The article deals with the issues of increasing energy efficiency in obtaining oil from cotton seeds. The relationship between the amount of oil obtained and the degree of damage to cotton seed pulp is shown. Electropulse treatment of cotton seeds is expected to increase the amount of oil produced and to reduce energy costs in the technological process. As a result of applying the proposed technology, the process of pressing and squeezing oil from cottonseed seeds, reducing the duration of the frying of seeds in turn makes it possible to reduce the extracted technical oil.

Keywords: technological lines, sowing seeds, forpress shop, Chebishev's method, Energy characteristic, cotton-fertilization, cellule structure, electrical impulse.

ЭЛЕКТРО-ТЕХНОЛОГИИ ДЛЯ ПОВЫШЕНИЯ ЭНЕРГЕТИЧЕСКОЙ ЭФФЕКТИВНОСТИ В ПОЛУЧЕНИИ ХЛОПКОВОГО МАСЛА

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Аннотация. В статье рассматриваются вопросы повышения энергетической эффективности при получении масла из хлопковых семян. Показана взаимосвязь количества получаемого масла со степенью поражения мезги хлопковых семян. Электроимпульсной обработкой семян хлопчатника предполагается повысить количество получаемого масла и снизать затраты энергии в технологическом процессе. В результате применения предлагаемой технологии процесс прессования и отжим масла из семян хлопчатника, снижения продолжительности обжаривания семян в свою очередь даёт возможность снижению экстрагированного технического масла.

Ключевые слова: технологические линии, сея семена, процесс пресса, Чебишев метод, характеристика энергии, хлопок оплодотворение, структуры клетки, электрических импульсов.

Oil and fat products in food mix clusters, especially from technical seeds; cotton oil which has a specific character is one of the most important products for our domestic needs. Demand for oil and fat products, the growing demand of the population and corporate food stuffs to meet the growing population of the country.

Cotton fiber from technical cotton seeds is a process that has been taking place since ancient times, thereby providing a mechanical affinity for seeds. Seeds and other oil-bearing crops, our ancestors used pestilences. The technical refinement of land management will improve this process.

Today cotton oil extraction from technical cotton seeds is carried out on technological lines, including the sequential execution of several technological processes.

Table 1. The technological processes and the energy consumed in them for the treatment of crude oil.

N	Technological processes	Hardware name	Productivity	Electricity consumption for 1 tons of cotton seeds; kW*h
1	**Seed growing and preparation shop**			**127,3**
	Purification of seeds	USM	140 t/milk	23,98
	Moistening	VNIIJ	100 t/milk	21,22
	Exit		120 t/milk	
	Separation	P1 – MCT	140 t/milk	32,6
2	**Sowing seeds**	**BC – 5**	**100 t/milk**	**33,7**
3	Forpress shop			**123,4**
	Roasting of the product	J – 68	140 t/milk	30,3
	Pressing	FP	100 t/milk	93,1
4	**Water supply**			**12,99**
Total				**297,39**

The data given in table 1 show that at the oil-and-gas production enterprises; up to 1000 tons of cotton seeds, up to 297.3 kW*h of electricity up to 65% of primary energy consumption is consumed.

$$M_m = \frac{W_{black\ oil}}{W_{total}} = \frac{297.39}{451.1} = 0.65$$

As well as technologies for production of cotton oil are energy – intensive processes. At present, the existing oil-and-gas plants in our country use $1.2*10^6$ kW*h for processing 1 ton of cotton seed. [2]

It is an important stage in the processes of cleaning, cutting, crushing and crushing hydraulic treatment of cotton seeds from technical cotton seeds.

Sowing seeds 2 t us not the same as breaking the various tissues of the cervix when burning the heifer or the stomach. During the crushing of the sunflower, the epidermis is less distracted then the other parts of the seed and its surrounding mucus. The crushing of cotton seeds is the most resistant to spleen. The strength of the crust is higher than the strength of the crust.

In the first case, the cellule structure is broken partially through the five-valve crankcase, while the cellule structure is broken down secondly, and the partial disruption of the cellule structure begins with the alebral hinouros and lipid granulates. After the third time the cell the walls are completely damaged but unbroken lipid granules remain in the shell.

Nowadays there are used BC – 5 five-dimensional coal-fired structures and oil-and-gas production enterprises. Production capacity of the tumble dryer for cotton seeds is 4.16 t/h. In order to measure the power consumption of the five-dimension grinders, the grinding device is loaded with 0. 25. 50. 75. 100% of the product and at the same time the product quality (product humidity).

Chebishev's method is used to obtain the energy characteristics of the trench. It is possible to determine correlation equation and calculation error using this method. [3]

Correlation equation using the Chebishov method is expressed as follows.

$$r^{(h_1)}_{(j_1)/1} = \Sigma \frac{D^{(q)}_{q_1} D^{(q)^*}_{q_1}}{D^{(q_1-1)} D^{(q_1)}}; \qquad (2)$$

The equation error is σ=±0.016 kW computational error detection formula.

$$\sigma^{(2)} = \sigma_y \sqrt{1 - r_{1/1}^2 - \frac{b_1}{a_1}}; \qquad (3)$$

The return value of the calculated value ±0.13%

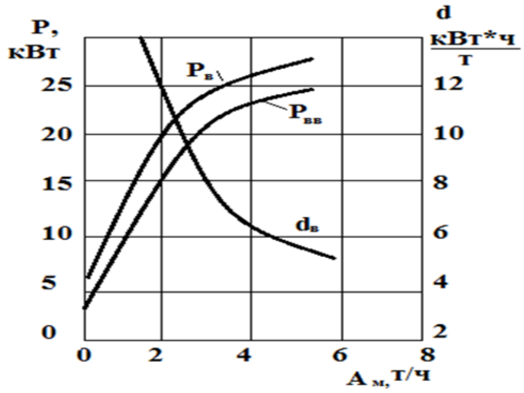
Based on the calculations the specific energy consumption and power equation required for the crushing of 1 ton beacon are obtained.

$$P_B = 7.5 + 10.93 A_м - 2{,}781 A_м^2 + 0{,}286 A_м^3$$

$$d_B = 10.93 - 2{,}781 A_м + 0{,}286 A_м^2 + \frac{7.5}{A_м}$$

Here is the productivity of the A_m – ring architecture.

The description of the dimensional costing structure constructed according to (3) and (4) is given in figure 1 d_B P_B



Picture 1. Energy characteristic of the five-valve crankcase.

Analysis of the description shows that efficiency increases from 0 to 3.5-4.0 t/h which means that the power consumed increases by 2% of each increase in fertility rate. The maximum load capacity of the cooking unit is the most energetic regime is optimistic.

However, product degradation should not exceed 85-90% under defined conditions. As indicated but the energy descriptions of the crankcase construction, the specific electricity consumption is 35-40% higher than the maximum.

Based on the data above the analysis of power consumption of oilseeds on existing oil-and-gas producing enterprises is based on the w=35000-37500 kW capacity of energy consuming installations for three power supply reconstructions products is composed of.

Nowadays almost all fat-and-oil enterprises use cotton fiber roasting method. According to this method, depending on the varieties of cotton seeds moistened before melting to 12.0-17.5% and the temperature is increased up to 65-70º C.

Then the moisture in the taste is fried at 6-7% at a temperature of 100-105º C. the main objective of the task is to create favorable conditions for the extraction of crude from the raw material. The properties of proteins, phosphatides, various nitrogen substances, specific pigment gossypol and its properties. Some of the gossypol, which is toxic to the effect of moisture and temperature is harmful to the proteins and phosphatides. However the fattening ability of the grass which is obtained by the denaturatures of proteins at high temperatures, decreases. In addition, other substances (amino acids, lysine and methionine) are subject to varying degrees of heat and are subject to change, as we know, the heat capacity of the product to be heated regardless of the heating method (in heat treatment) should be considered. If

$$C_я = 1{,}372 + 0{,}0069 \cdot t, кДж/(кг \cdot {}^0C)$$

the specific heat load of the technical seeds is then the average tidal temperature after the representative grinder is t=25º C while the specific heat capacity of the crockery $C_я = 1.5445 кДж/(кг \cdot {}^0C)$. we use the following formula for the heat energy required to heat a kilogram of heated to a certain temperature.

$$Q = m \cdot c(t_2 - t_1) кДж/кг \quad (6)$$

Where: m-is the product mass. C-specific thermal capacity t_1 –product initial temperature, t_2 –thermal heating temperature.

If it is cooked from technical seeds at 100-105º C. 115,83 kJ is consumed for 1 kg of product, 115830 kJ for roasting 1 ton of product. 35 tonnes per day for processing and 4054050 kJ per day for roasting.

The difference between electrolytic processing and other electrophysiological effects is that when electropulsed machining of technical seeds suddenly affects the product electrical and mechanical factors. In this complex cells are corroded and parenchymal cells are damaged resulting in a uniform disruption of the cell size of the seeds.

The results of primary electropulsed processing of cottonseeds are shown in table 2.

Indications obtained from experiments

Table 2. The effect of the technical seeds on the process of oil refining when electro-impulse treatment

№	Processed product markers			Electrical impulse parametrs			Indicates the product you are buying		Total oil volume %
	Class of seeds prepared for treatment	Mineral and organic compounds %	Humidity moisture in %	Voltage kV	1 pulsed energy kJ	Processing time sec.	Oil in the cotton seed	Fat percentage %	
1	2	3	4	5	6	7	8	9	10
"Sultan" of cotton									
1	II	1,195	8.5	6	14.4	12	20.5	3.362	17.138
2	III	1.324	9.2	9	32.4	13	17.3	3.148	14.152
3	IV	1.953	9.7	10	40	15	16.1	3.484	12.616
"Brilliant" of cotton									
1	II	1,143	8.4	6	14.4	12	21.1	3.244	17.865
2	III	1.531	8.8	9	32.4	13	18.6	3.39	15.21
3	IV	2.013	9.1	10	40	15	16.7	4.785	11.915
"Namangan" of cotton									
1	II	1,155	8.7	6	14.4	12	20.1	3.176	16.924
2	III	1.629	9.1	9	32.4	13	18.4	3.529	14.871
3	IV	1.983	9.5	10	40	15	15.9	4.057	11.843
"C65-24" of cotton									
1	II	1,301	8.5	6	14.4	12	21.0	3.105	17.895
2	III	1.714	8.7	9	32.4	13	19.2	2.97	16.23
3	IV	2.473	9.3	10	40	15	17.2	2.873	14.327

The cotton based cotton-fertilization method is 14.6% higher than that of cotton seeds which if processed with electric pulse increase by 3.5-4%. With the use of the proposed technology increasing the amount of oil in the seeds during the pressing process, decreasing the duration of the frying process by up to 2 times and decreasing the energy consumption of 115.83 kJ to 69.5 kJ per 1 kg of product at 65-70º C opportunity saves 46330 kJ of energy while roasting for processing 1 tonnes of cotton seeds. Were the temperature is 65-70º C to reduce the viscosity of the product in the oil. In turn, it is possible to reduce the amount of extracted technical oil.

Summarized

The amount of oil obtained from cotton seeds is 14.6% more than seeds and 35% for 8% in cotton, while in the case of electric pulses this indicator will increase by 4.5-5%.

As a result of the use of the proposed technology, pressurized grease con be used to further reduce the content of the seeds reduce the duration of the frying process and reduce the amount of technical fat that is extracted.

With the use of electric pulse treatment the secondary product obtained by reducing the temperature and time of the roasting process in the present technology can preserve the fertility of the shrot preventing the loss of protein in it.

References

1. Strategy of action for the further development of the Republic of Uzbekistan // Collection of the legislation of the Republic of Uzbekistan. – 2017. No. 6. No. 70, article 20, article 354.

2. Salimov Z. Intensification of technological processes and prosthodontics cottonseed oil. – Tashkent: Uzbekistan, 1981. – 266 p.

3. Ibragimov M., Turdiboyev A., Avliyokulov R. Application of energy-efficient electrotechnology in the production of vegetable oil // The Republican Scientific-Practical Conference "The Importance of Innovative Technologies in the Solution of Energy Efficiency and Energy Efficiency of Industrial Enterprises". – Qarshi-2016 y. – P. 64-67.

4. Turdiboyev A.A., Tadjibekova I.E., Akbarov D.M. Use of electrotechnical methods in obtaining cotton oil // Caspian research institute of arid land agriculture. Modern natural ecological state environment and scientific and practical aspects of environmental management. – Salty Zaymishche, 2018. – P. 1154-1159.

5. Hydro electric processing of oil plants // Safarov A.F., Artikov A.A., Usmanov A.U., Mamatkulov A.H, Sarimsakhadjayev A.R. Food manufacture. – M.: Agropromizdant, 1990. – P. 25-26.

6. Turdibayev A., Vahidov A., Hurramova Z. The results of electro physic method in producing cotton oil // Agro science magazine Tashkent. – 1012. – № 2(22). – P. 77.

7. Artikov A.A., Safarov A.F., Mamatkulov A.H, Saidmuradov U.A. and others. Methods of producing oil from cotton seed.

8. Artikov A.A., Safarov A.F., Shomuradov T,R, Gafurov K.H, Bazarbayeva D.Sh. Method of producing oil from cotton bones.