

**ФАН ВА ТЕХНОЛОГИЯЛАР
ТАРАҚҚИЁТИ**
**РАЗВИТИЕ НАУКИ И
ТЕХНОЛОГИЙ**



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Тахририят ҳайъати раиси:

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ОЛТИЕВ А.Т. – техника фанлари доктори, (DSc)

ЖАЛИЛОВ Р.Б. – техника фанлари доктори (DSc), профессор

МАХМУДОВ М.И. – техника фанлари доктори (DSc), профессор

МАЖИДОВА Н.Қ. – техника фанлари доктори (DSc), профессор

АХМЕДОВ В.Н. – кимё фанлари номзоди, профессор

МАХМУДОВ Р.А. – техника фанлари доктори (DSc), профессор

ПУЛАТОВА М.И. – физика-математика фанлари номзоди, профессор

Бош муҳаррир:

ДЎСТОВ Ҳ.Б. – кимё фанлари доктори, профессор

Муҳаррирлар:

БАРАКАЕВА Д.Ф., ОРТИҚОВА С.Ж., ИСТАМОВА Г.Х.

Мусахҳиҳ:

АРТИКОВА М.М.

ФАН ВА ТЕХНОЛОГИЯЛАР

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РАЗВИТИЕ НАУКИ И

ТЕХНОЛОГИЙ

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Тахририят манзили:

200100, Бухоро шаҳри, Қ. Муртазоев кўчаси, 15-уй, Бухоро давлат техника университети

Тел: 0(365) 223-92-40

Факс: 0(365) 223-78-84

Электрон манзил:

E-mail: fantt_jurnal@umail.uz

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IMPROVEMENT AND MATHEMATICAL MODELING OF THE PRESSING PROCESS OF OILSEED FUZA OF COTTON BLACK OIL

Savriyev Y.S., Azizov B.A., Xamroyev X.X.

Bukhara state technical university.

Abstract. The objective of this research work is to obtain edible oil from the sludge (fuza) of vegetable oil that meets the requirements of GOST, as well as to reduce material costs. This problem is solved by the fact that according to the fuza processing method, which includes the primary purification of oil by settling it in a mechanical thickener (fusolovushka), the fuza obtained from the fusolovushka is sent for extraction to a hydrocyclone-type centrifugal extractor. The resulting miscella from the extractor is sent to distillation. Fuz after fusolovushka contains 49-50% oil, 24-36% moisture. The concentration of the miscella at the outlet of the first hydrocyclone is 10-11 %; at the outlet of the second - 18-19%. To identify the optimal mode, a number of experiments were conducted under the influence of influencing factors: the hydromodule and the solvent pressure. The solvent temperature in all experiments is equal to 55-600C, since the solvent temperature in production conditions is exactly this value.

Keywords: vegetable oil, detonator, mathematical modeling, systems thinking, pressing process, oil sediment, black cottonseed oil, vegetable oil sediment, filtration.

PAXTA QORA MOYINING MOYLI FUZASINI PRESSLASH JARAYONINI TAKOMILLASHTIRISH VA MATEMATIK MODELLASHTIRISH

Savriyev Y.S., Azizov B.A., Xamroyev X.X.

Buxoro davlat texnika universiteti.

Annotasiya. Maqolada yuqori moyli cho'kindi (fuza)ni presslash ob'ektini tahlil qilishda tizimli fikrlash metodikasi va uning ko'p bosqichli ierarxik strukturasi ishlab chiqilgan; yuqori moyli cho'kindi (fuza)ni presslab o'simlik moyi olishda faza o'zgarishlarini va qattiq faza hajmi, undagi qoldiq moy miqdorining o'zgarishlarini ifodalovchi qonuniyatlari aniqlangan; moy olishning presslash usulida moyli cho'kindi (fuza)dan moy olish koeffitsienti va ushbu koeffitsientga ko'ra, kompyuter modeliga haqiqiy jarayon bo'yicha tuzatishlar kiritilishi aniqlangan; apparatning ishchi zonasidagi parametrlarning uning uzunligi bo'yicha taqsimlanish darajasining bog'liqligi va bu kvazi-apparatlarga bo'lingan apparatning umumiy ishchi zonasi aniqlangan.

Kalit so'zlar: o'simlik moyi, fuza, matematik modelashtirish, tizimli fikrlash, presslash jarayon, moyli cho'kindi, qora paxta moyi, o'simlik moyi cho'kmasi, filtrlash.

СОВЕРШЕНСТВОВАНИЕ И МАТЕМАТИЧЕСКОЕ МОДЕЛИРОВАНИЕ ПРОЦЕССА ПРЕССОВАНИЯ ХЛОПЧАТОБУМАЖНОЙ ЧЕРНОЙ СМАЗКИ Савриев

Савриев Ю.С., Азизов Б.А., Хамроев Х.Х.

Бухарский государственный технический университет.

Аннотация. Цель исследования в статье- получение съедобного масла из глины растительного масла (Фуза), соответствующего требованиям ГОСТа, а также снижение материальных затрат. Эта проблема решается по способу обработки взрывателя, включающему первичную очистку путем помещения масла в механический загуститель (фузоловушку), при этом взрыватель, полученный из фузоловушки, направляется на экстракцию в центробежный экстрактор гидроциклонного типа. Полученную из экстрактора мицеллу отправляют на перегонку. После фузоловушки Фуз содержит 49-50% жира, 24-36% влаги. Концентрация мицеллы на выходе первого гидроциклона 10-11%; на выходе второго - 18-19%. Для определения оптимального режима был проведен ряд экспериментов под воздействием влияющих факторов: гидромодуля и давления нагнетателя. Во всех экспериментах температура растворителя равна 55-600C, так как в производственных условиях температура растворителя именно это значение.

Ключевые слова: растительное масло, взрыватель, математическое моделирование, системное мышление, процесс прессования, масляный осадок, черное хлопковое масло, осадок растительного масла, фильтрация.

Method for determining the oil content in the fuze. Terms and definitions. In the proposed standard [1], all substances extracted under the conditions established by this standard are expressed as a mass fraction or as a percentage.

The essence of the method. For analysis, the sample is extracted in an extractor with technical hexane or, in its absence, with light petroleum ether. The solvent is distilled and the resulting residue is weighed. The mass fraction of crude fat, w, %, is calculated by the formula [1]:

$$W = 100 \cdot \frac{m_1}{m_0} \quad (1)$$

where m0 is the mass of the sample for analysis, g; weighed to an accuracy of 0.001 g of

approximately 10 g of the laboratory sample; t_1 is the mass of raw fat after drying, g; most of the solvent is removed from the flask by distillation on an electric heating bath or heating tile. The last traces of solvent are removed by heating the flask for about 20 minutes in a thermostat, at a temperature of 103 ° C. Express the result up to the first decimal place

The method of determining the humidity of the fuse.

The humidity of the fuse without pre-drying W_1 , %, is calculated by the formula [2]:

$$W_1 = \frac{(m - m_1) \cdot 100}{m - m_2} \quad (2)$$

where m is the mass of the box with seeds before drying, g; m_1 is the mass of the box with seeds after drying, g; m_2 is the mass of an empty box, g. The permissible discrepancy between the results of two parallel determinations with a confidence probability $p=0.95$ should not exceed 0.25% abs. If the permissible discrepancy between the results of two parallel definitions is exceeded, the analysis is repeated.

The arithmetic mean is taken as the final result of the analysis. Material for experiments. The following materials were used for the experiments: fusa separated at the fuso separator of the press shop of the Eurosnar LLC plant in the Zhondor district of the Bukhara region with an oil content of 53% and a humidity of 25%. Cotton seed husk with a moisture content of 13% (production on April 15-25, 2019). For experimental studies of determining the above parameters and modes, we have developed an experimental setup consisting of a mini-press (Fig.1) and containers for mixing and settling the mixture “high-oil fusa - husk of cotton seeds”.

Determination of influencing factors on the process and planning of the experiment. Experimental research is a necessary stage of the cognition process. Dealing with various processes and objects in their activities, a person gradually accumulates practical information about these processes and objects, which helps him to know them and, based on this knowledge, improve and optimize the process. But almost always there is clearly not enough information to draw any conclusions. Then the process must be investigated experimentally according to a pre-made plan.

An experiment is a series of experiments united by a single goal, a single system of constraints in space and time (u is the number of the experiment, $u = 1 \div N$). Experience can be considered the implementation of certain conditions and rules on an object. As a result of the experience, one or another result appears. The appearance of the result is recorded using some parameter, which, as a rule, has a numerical expression and most fully characterizes the effectiveness.

In Fig.2, $x_1, \dots, x_k$ - input measured and adjustable parameters of the object; $y_1, \dots, y_m$ - output parameters. The complex of parameters $x_1, \dots, x_k$ is called the main one, it determines the experimental conditions.

It is known that the production of oil from cotton seeds is carried out in two stages. At the first stage, the preprepared oilseed raw materials are pressed, while 50-60% of the oil is obtained from the core. Then, at the second stage, the oil cake is treated with a solvent- extrabenzine, which helps to reduce

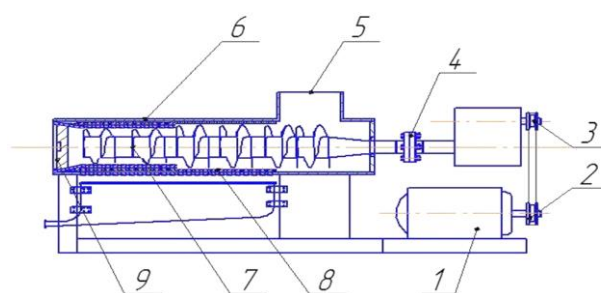


Fig.1. Apparatus for studying the process of pressing oilseed fusa: 1-electric motor; 2-drive pulley; 3-driven pulley; 4-coupling; 5-hopper for loading raw materials; 7-auger; 8-seed device; 9-clearance adjustment cone

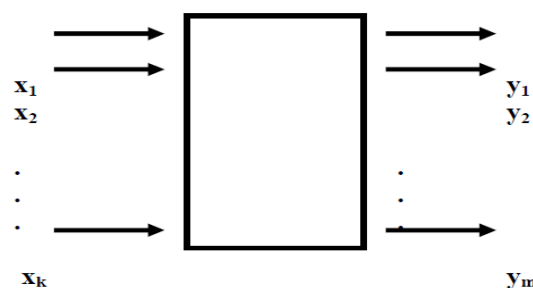


Fig.2 Input and output parameters of the process

the oil content of the latter to 0.3%, i.e. we get cotton meal. The cotton oil obtained by pressing is sent for its use for food purposes, and the oils produced by the extraction method are sent for use for technical purposes.

The technological scheme for the production of cotton oil by pressing method at all cotton seed processing plants carries out the following main processes: preparation of seeds for collapse, seed collapse, separation of the seed kernel from the husk, crushing of the kernel, moisture-heat treatment of mint, frying mint and obtaining pulp, pressing pulp, fuzz separation from the composition of black oil, separated fusel is sent back to frying, filtration of black oil, collection of black oil, pumping for refining, oil cake is sent for extraction.

In this technological scheme, after the return of the separated fusee to frying, due to the duration of the frying process, the acidity of the black oil begins to increase to 5-6 units. in place of 2-3 units obtained after pressing, which in turn helps to reduce the yield of black oil during refining. The solution to this problem is to prevent the fuse separated on the fuse separator from getting back into the brazier.

The following tasks of experimental research follow from the above:

- determination of the most rational ratio in the percentage ratio of the mixture "oilseed fuza-husk of cotton seeds";
- determination of the duration of mixing the mixture to create a uniform distribution of components in the volume;
- determination of the pressing mode that ensures maximum oil yield (minimum oil content in the cake) after pressing.

Our experimental studies are aimed at determining the percentage composition of the mixture consisting of the husk of cotton seeds and oilseed fusee, determining the duration of mixing of the mixture, ensuring the maximum output of black oil after pressing.

The experiments were carried out in the production conditions of the cotton seed processing plant "Zhondor Eurosna LLC". Preliminary experiments to determine the rational ratio of the mixture "oilseed fuza-husk of cotton seeds". When pressing oil-containing crops, the structure of the pulp has a great influence. The structure of the finished pulp depends on the degree of grinding of the seed kernel. The structure of the pulp for pressing should ensure plasticity, elasticity, ensure good briquetting of the roll, develop a sufficiently high pressure during pressing without the pulp crawling out of the zeers and at the same time obtain the maximum specified oil content, convergence of the external and internal surfaces of the pulp particles. The efficiency of the pressing process depends on the physical and mechanical properties of the pressed material and the conditions of the organization of pressing.

Table-1

The results of experiments to identify the rational ratio of "high-oil fusa - husk of cotton seeds"

Number of husks in the mixture, (kg)	Number of fusees in the mixture, (kg)	Total quantity of the mixture (kg)	The percentage of husk in the composition of the mixture, %	Residual oil content of cake, %
2,5	10	12,5	20	28
4,3	10	14,3	30	27
6,7	10	16,7	40	22
10	10	20	50	18
15	10	25	60	12
20,5	10	30,5	67,2	8,05
23,3	10	33,3	70	8,35
23,1	10	33,29	75	8,9

When pressing under the influence of external pressure on the pressed material, as it moves along the screw shaft, the convergence of external and internal particles of the material will occur in the core chamber, which contributes to the squeezing of the liquid phase from the gaps between the particles, then from the To identify the rational ratio of the mixture "high-oil fuza - husk of cotton seeds", we will plot the dependence of the change in the residual oil content of the cake on the amount of husk (in%) in the mixture according to Table 1.

From the graph (Fig.3) it can be seen that a change in the ratio of the husk of cotton seeds and high-oil fusa in the mixture significantly affects the residual oil content of the cake obtained after pressing. As the amount of husk increased relative to the high-oil fusel to 67.2%, the residual oil content of the cake obtained after pressing decreased to 8.05%, and a further increase in the added amount of husk more than 70% showed an increase in residual oil content, for example: when adding 75% of the husk, the residual oil content of the cake was 8.9%, which increases the amount of technical oil, so how the cake is then sent for extraction.

The change in the composition of the mixture affects the change in mechanical properties such as plasticity, the thickness of the lobe, as well as the temperature of the pressed material. Since the rational composition of the mixture consists of a high-oil fusel of 30% and the husk of cotton seeds of 70%, for the organization of its pressing process, an even distribution of the components of the mixture must be ensured.

The structure of the pulp is directly affected by its humidity, while there is some weakening of the forms of connection of the oil with the gel part. Due to the weakening of the binding energy in the pulp, the amount of oil changes compared to the cake due to a decrease in the specific surface area of the pressed material and an increase in temperature in the press chamber.

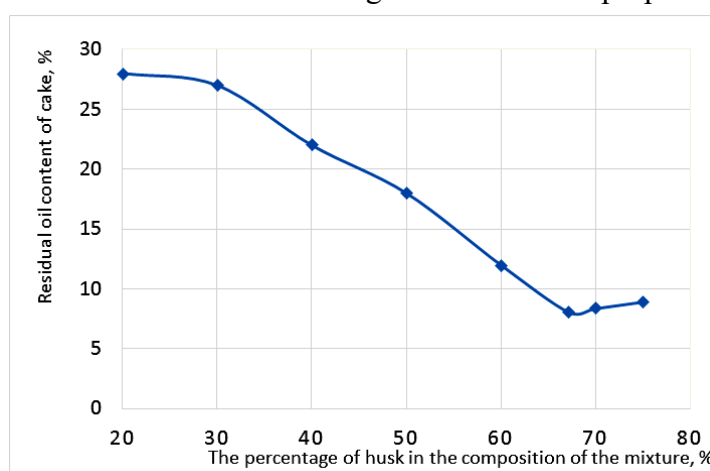


Fig.3. Dependences of the change in the residual oil content of the cake on the amount of husk (in%) in the composition of the mixture

Table-2

The results of experimental studies to determine the duration of mixing the mixture

№ п/п	Mixing time (minutes)	Residual oil content of the cake after pressing, (%)
1.	1	28,00
2.	2	27,00
3.	5	22,00
4.	15	18,00
5.	25	12,00
6.	30	8,050
7.	35	8,040
8.	40	8,036
9	50	8,036

Experiments on mixing the components of the fuza-husk mixture were carried out on the developed laboratory mixing plant of the horizontal type to determine the rational duration of the process, which contributes to the uniform distribution of the constituent components over the volume of the mixture.

Below in the table.2 shows the results of experimental studies to determine the duration of mixing of the mixture, the minimum residual oil content of the cake after pressing is taken as the main output parameter. At the same time, each experiment ended with the pressing of a sample of the mixture. Based on the experimental data obtained, a graph of the change in the residual oil content of the cake depending on the duration of mixing was constructed (Fig.4).

The graph shows that with an increase in the duration of mixing the mixture, its residual oil content decreased, starting from 30 minutes and further continuation of mixing does not affect the change in the residual oil content in the cake, i.e. reaches 8.05%. Therefore, mixing should be continued for up to 30 minutes.

Experimental design techniques (English experimental design techniques) is a set of measures aimed at the effective staging of experiments. Experiment planning is the optimal control of the experiment in conditions of incomplete information about the mechanism of the process [5;-C.10, 6;-C.6, 7;-C., 133;-C.6, 8;-C.11]. The conditions for conducting each experiment are regulated by the experiment plan. According to the results of experiments, following a certain algorithm, an appropriate equation is obtained that characterizes the influence of factors on the effectiveness of the process under study [5;-C.9]. The oil content of the fusee in all experiments is 53%, since the oil content of the fusee in production conditions is exactly this value, therefore this factor will remain unchanged in all experiments.

The humidity of the fusee is 25.2%, which will also be unchanged in all experiments for the same reasons mentioned above. The precipitate (fuz) from the fusolovushka is weighed on a VLR-200 scale with an accuracy of 0.01 g. The relative humidity (in%) is determined according to GOST 10856-96 and the oil content in the material (in% of the total weight of the fuz) according to GOST ISO 734-1-2016.

The main influencing factors for the process are the percentage of husk in the mixture (in%) and the duration of mixing (in min.), since the structure of the pulp depends on these factors, which affects the efficiency of the press, which determines the residual oil content of the cake (black oil yield). From preliminary experiments, the boundary values of these factors were determined:

The first factor is the percentage of fuza in the composition of the mixture.

The lower level is $x_{1\min}=25\%$; the upper level is $x_{2\max}=35\%$.

The second factor is the duration of mixing.

Lower level $x_{2\min}=30$ min; upper level $x_{2\max}=40$ min.

In general, an experiment in which all possible combinations of factor levels are implemented is called a complete factor experiment.

The simplest symmetric ($\sum_{i=1}^N x_{iu} = 0$) and orthogonal ($\sum_{i=1}^N x_{iu} x_{ju} = 0$) The plan is a two-level plan for a complete factorial experiment of PFE2p.

The plan provides for the implementation of all possible experiments, the conditions of which correspond to any combination of the values of the studied factors when they change only at two levels: upper and lower (see Fig.5) [5;-C.67.].

$$\text{Experiment Center} \quad C_{i0} = \frac{c_i^+ + c_i^-}{2} \quad (3)$$

corresponds to the zero ($x_i=0$) level of the magnitude of the factors, the intervals of variation λ_i are

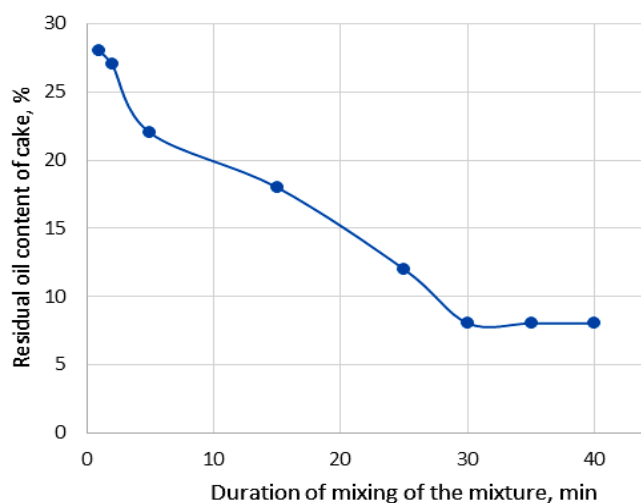


Fig.4 Change in the residual oil content of the cake depending on the duration of mixing.

calculated from it:

$$\lambda_i = C_i^+ - C_{i0} = C_{i0} - C_i^- \quad (4)$$

The interval of variation of factors is a certain number (its own for each factor), the addition of which to the main level gives the upper, and subtraction – the lower levels of the factor. For the first factor, the center of the experiment:

$$C_{10} = \frac{C_1^+ + C_1^-}{2} = \frac{35 + 25}{2} = 30 \%$$

For the second factor, the center of the experiment:

$$C_{20} = \frac{C_2^+ + C_2^-}{2} = \frac{40 + 30}{2} = 35 \text{ мин}$$

For the first factor, the variation interval:

$$\lambda_1 = C_1^+ - C_{10} = 35 - 30 = 5 \%$$

For the second factor, the variation interval:

$$\lambda_2 = C_2^+ - C_{20} = 40 - 35 = 5 \text{ мин}$$

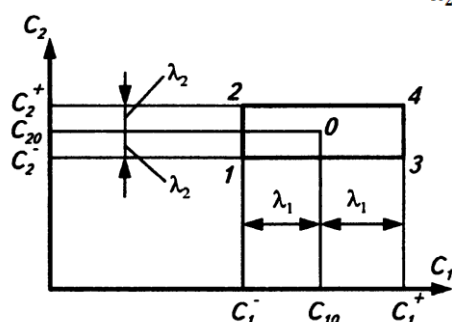


Fig.5 The PFE22 plan in the natural dimension of the factors

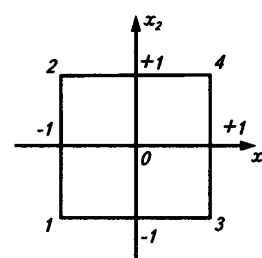


Fig.6. The PFE22 plan in dimensionless terms of factors

When drawing up uniform plans for multifactorial and multilevel research, the dimensionless magnitude of the factors is obtained by the formula

$$x_{iu} = \frac{C_{iu} - C_{i0}}{\lambda_i} \quad (5)$$

Ciu is the value of the i-th factor in the u-th experiment [5;-C.64.].

The number of experiments of PFE2p plans corresponds to the number of combinations of n elements when they are changed at two levels

$$N = 2^n \quad (6)$$

For our two-factor experiment, the number of experiments is equal to $N = 2^2 = 4$.

In accordance with (4) and (5), we find the numerical values of the upper x_i^+ and x_i^- lower levels of the factors in dimensionless expression [5;-C.66.].

$$x_i^+ = \frac{C_i^+ - C_{i0}}{\lambda_i} = \frac{C_i^+ - C_{i0}}{C_i^+ - C_{i0}} = +1 \quad (7)$$

$$x_i^- = \frac{C_i^- - C_{i0}}{\lambda_i} = \frac{C_i^- - C_{i0}}{C_i^+ - C_{i0}} = -1$$

$$C_{ui} = C_{i0} + \lambda_i x_{ui} \quad (8)$$

Table-3. Two-factor experiment plan

u	x_{1u}	x_{2u}
1	-	-
2	-	+
3	+	-
4	+	+
C_{i0}	30	35
λ_i	5	5

Consequently, any factor at the lower level in dimensionless terms is characterized by a number minus one (-1 or -), at the upper level - plus one (+1 or +). First, the plans of PFE2p are

recorded in dimensionless terms of the magnitude of the factors, and then a work plan is drawn up according to them in the natural dimension of the factors.

The conversion of the factor value to the natural dimension is carried out taking into account (6) according to the formula [5]

Processing of experimental results. Selection of the technological scheme
The results of the experiments are shown in Table.4. As an output, we consider the residual oil content of the cake after pressing y, %

Table-4

The results of the experiments carried out according to scheme 22.

№ expert	Factors		Effects of interaction of factors	Results of experiments			Average of results
	x_1	x_2		y_1	y_2	y_3	
1	-	-	+	12,7	13,2	14,1	13,333
2	-	+	-	10,5	12,2	11,7	11,466
3	+	-	-	8,4	7,54	8,2	8,0466
4	+	+	+	18,3	18,7	17,5	18,166

Based on the results of a two-factor experiment, we will make an equation in which, in addition to linear terms, there will be a term that takes into account the effect of paired interfactory interaction.

The regression equation in this case has the following form:

$$y = b_0 + b_1x_1 + b_2x_2 + b_{12}x_1x_2 \quad (9)$$

Regression coefficients are calculated using the formulas:

$$b_0 = \frac{\sum_{i=0}^N \bar{y}_M}{N} \quad b_1 = \frac{\sum_{i=1}^N \bar{X}_{1M} \bar{y}_M}{N} \quad b_{12} = \frac{\sum_{i=1}^N \bar{X}_{1M} \bar{X}_{2M} \bar{y}_M}{N} \quad (10)$$

The calculation results are shown in Table. 5.

Table-5

Results of calculations of regression coefficients values

Coefficients	b_0	b_1	b_2	b_{12}
Values	12,75	0,35	2,06	2,99

We determine the significance of these coefficients by the formula [130;- C.20]:

$$S_{\{y\}}^2 = \frac{\sum_1^N \sum_1^N (y_{ni} - \bar{y}_n)}{N(n-1)} \quad (11)$$

The mean square deviation of the coefficients:

$$S_{\text{коэф}} = \frac{S_{\text{восп}}}{\sqrt{N}} \quad (12)$$

In our case: $S_{\text{коэф}} = 0,24$

The calculated value of the Student's criterion is determined by the formula:

$$t_{\text{кр}} = \frac{|b_j|}{S_{\text{коэф}}} \quad (13)$$

From the Student's distribution tables [5;-p.283] by the number of degrees of freedom $n(m-1)=4 \cdot 2=8$ at the significance level $\alpha = 0.05$, we find $t_{\text{кр}} = 1.44$.

The calculated value of the Student's criterion is determined by the formula (13) $|b_j| = t_{\text{кр}} \cdot S_{\text{коэф}} = 1,44 \cdot 0,2400 = 0,346$.

Comparing the obtained value of 0.346 with the coefficients of the regression equation, we get that all the coefficients are greater in absolute value. Therefore, all coefficients are significant.

Then the regression equation (9) has the form:

$$y = 12,75 + 0,35x_1 + 2,06x_2 + 3,0x_1x_2 \quad (14)$$

The adequacy of the obtained regression equation is verified using the Fisher criterion [5;-C.53].

$$F = \frac{S_{\text{ост}}^2}{S_{\text{воспр}}^2} \quad (15)$$

$$S_{\text{ост}}^2 = \frac{\sum_{i=1}^N (y_i - y_{r_i})^2}{N - L}$$

here the residual

where L is the number of significant coefficients in the regression equation.

If the calculated value of the Fisher criterion is less than the tabular one, then the resulting regression equation adequately describes the experiment. Для нашего случая $S_{\text{ост}}^2 = 1,49813$.

At the significance level $\alpha = 0.05$ and degrees of freedom $k_1 = n - r = 4 - 3 = 1$ и $k_2 = n(m - 1) = 8$ $F_{\text{табл}} = 5,32$ [5;-C.280].

The calculated value of the Fisher criterion by the formula (15) $F_{\text{расч}} = 3,25$.

Means, $F_{\text{расч}} = 3,25 < F_{\text{табл}} = 5,32$. Based on this, we can conclude that the resulting model adequately describes the process.

Translating the values of the factors into the natural dimension according to formula (14), a graph of the dependence of the output of the process on the percentage of the fuze in the mixture and the duration of mixing was plotted on the MatCAD program (Fig.4.6).

It can be seen from the graph that with the values of influencing factors (the percentage of fuza in the mixture $x_1 = 33\%$ and the duration of mixing $x_2 = 40$ min), the residual oil content of the cake will be the smallest (8,0 %)[10; 11; 12;13].

In the proposed technological scheme for processing the separated high-oil fusee on the fuso separator, the latter does not return to frying, which leads to a decrease in the acid number of black oil. Therefore, we have determined the change in the acid number of oil coming from the presses to the fuze separator. At the same time, each oil sample was subjected to laboratory analysis under production conditions according to certain methods, where the acid number of black oil, oil color, oil moisture, oil temperature were determined. The results of the experiments are shown in Table 7. Based on the experimental data obtained, a graph of the change in the acid number of black oil depending on the time when the high-oil fusee is not returned to frying, where it is further pressed and oils and oil cake are obtained.

Table-7

The dependence of the indicators of black oil on the time of non-return of the fuse to the brazier.

Time of non-return of the fuse to the brazier (hour)	Acid number of black oil, mg KOH	Oil color (k.b.)	Oil humidity, %	Oil temperature, °C
0	6	35	0,29	85-90
1,5	3	34	0,28	85-90
2	2,4	28	0,24	85-91
2,5	2,2	24	0,22	85-92
3	1,6	18	0,2	85-93
3,5	1,2	16	0,2	85-94
4	1,2	14	0,2	85-95
5	1,2	14	0,2	85-96

It can be seen from the graph that when the high-oil fusee was returned for frying and further pressing, the acidity of the resulting oil reached 5-6 mg KOH, which is 2-3 units higher than the technological norm. To reduce the acidity of black oil to normal, additional costs are required

during refining. According to the proposed method, after 5 hours of operation of the processing line, the acidity of black oil decreased to 1.2 mg KOH, which contributes to an increase in the yield of refined oil by 2.5%.

The proposed technological scheme consists of the following main processes:

- mixing of oilseed fusel with the husk of cotton seeds;
- laying the mixture on the mixer;
- pressing the mixture to obtain black oil and cake;
- the direction of the black oil to the fuze separator;
- the direction of oil cake for extraction.

The proposed technological scheme consists of the following main devices: a fuze separator 1, a channel for receiving pressed black oil from presses 2, a redler for unloading separated fusel 3, a mixer for mixing separated fusel with husk 4, blades for mixing husk and fusel 5, a screw conveyor for feeding husk to the mixer 6, a heat for exiting the husk mixture and fuzes from the mixer 7, mini oil press 8, channel for the black oil outlet from the mini press 9, mini press head for the oil cake outlet 10, screw conveyor for the oil cake coming out of the mini press 11, nozzle for the selection of black oil from the fuze separator 12. The proposed technological scheme works according to the following sequence and interconnection of devices [10; 11; 12;13; 14]. The separated fuze with an oil content of about 50% from the fuze separator is directed to a container with a mixer with a volume of 3 m³, while the mixer in the form of blades has a speed of 4 rpm with a power of 0.5 kW, the husk is fed to this container.

Conclusion. A method of conducting experiments has been developed, where the method and determination of the oil content and humidity of the fuze are given, the characteristics of the material for experiments are given. Preliminary experiments were carried out to determine the most rational ratio in the percentage of the mixture "oilseed fuze-husk of cotton seeds" and to determine the duration of mixing the mixture to create a uniform distribution of components in the volume. It was revealed that as the amount of husk increased with respect to the high-oil fusel to 67.2%, the residual oil content of the cake obtained after pressing decreased to 8.05%, and the uniform distribution of the components of the mixture - fusel 30% and cotton seed husk 70%. The influencing factors on the process are determined - the percentage of fuze in the composition of the mixture from 25 % to 35%; the duration of mixing of the components of the mixture from 30 to 40 minutes. A plan for a two-factor PFE22 experiment has been developed and experiments have been carried out. As a result of processing the results of the exp

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SOG'LIQNI SAQLASH SOHASINI RAQAMLASHTIRISH ISTIQBOLLARI

Hasanova D.B.

Buxoro davlat texnika universiteti.

Annotatsiya. Raqamlashtirish strategiyalari ko'pincha bemorlarga sifatli va tezkor xizmat ko'rsatishda professional hamkorlik va sifatni ta'minlash uchun texnik o'zaro bog'liqlik va uyg'unlikni rag'batlantiradi. Respublikamizda raqamlashtirish hali to'la kirib kelmagan sohalaridan bittasi meditsina sohasi bo'lib, ushbu maqola sog'liqni saqlash tarmoqlarida barqaror yechimlarni ta'minlaydigan sog'lom raqamli sog'liqni saqlash muhitini joriy etish haqida tushunchalar berilgan.

Kalit so'zlar: axborotlashtirish, raqamli transformatsiya, axborot tizimi, elektron baza, elektron tibbiy kasalliklar tarixi, jamiyat platformalari, online so'rovnomi.

ПЕРСПЕКТИВЫ ЦИФРОВИЗАЦИИ ОТРАСЛИ ЗДРАВООХРАНЕНИЯ

Хасанова Д.В.

Бухарский государственный технический университет.

Аннотация. Стратегии цифровизации часто поощряют техническую совместимость и согласованность для обеспечения профессионального сотрудничества и качества ухода за пациентами. Одной из областей, где цифровизация еще не полностью проникла в нашу республику, является сфера медицины, и в этой статье представлено понимание внедрения здоровой цифровой среды здравоохранения, обеспечивающей устойчивые решения в сетях здравоохранения.

Ключевые слова: информатизация, цифровая трансформация, информационная система, электронная база данных, электронная история медицинской глухоты, общественные платформы, онлайн-опрос.

PROSPECTS FOR DIGITALIZATION IN THE HEALTHCARE SECTOR

Khasanova D.V.

Bukhara state technical university.

Abstract. Digitalization strategies often encourage technical interoperability and harmonization to ensure professional collaboration and quality in patient care. One of the areas where digitalization has not yet fully penetrated in our republic is the medical sector, and this article provides insights into the implementation of a healthy digital health environment that provides sustainable solutions in healthcare networks.

Key words: informatization, digital transformation, information system, electronic database, electronic medical record, community platforms, online questionnaire.