Statistical assessment of the comparative breaking strength of yarns with different fiber composition

Dilafruz Kazakova[1,*], *Ilkhom* Abbazov[1], *Khurshid* Yuldoshev[1], *Sardor* Tojimuradov[1], *Kumush* Baratova[1]

[1]Jizzakh Polytechnic Institute, 130100 Jizzakh, Uzbekistan

Abstract. This article studied the factors affecting the quality of cotton yarn. The properties of cotton fiber and their changes in technological processes play an important role in product production. Therefore, cotton fibers with different staple lengths of 28.5, 29.0, and 29.5 mm were used in the test work. Because it is advisable to use long fiber cotton fiber to get single yarn spun for sewing threads, for each option, different twists on the thread, i.e. the number of twists in 1 meter of thread were 850, 900, 950 b/m. The strength of individual threads ensures the quality of the product obtained from it, so we use the above number of twists. In order to determine the relative breaking strength of a single thread for sewing threads, experimental tests were conducted. According to the conducted experimental tests, 2 incoming factors were selected. As an output parameter, the relative tensile strength of the yarn, sN/tex (U) as input parameters, the effect of fiber staple length in mm, and the number of twists on the b/m indicator were studied based on the experiment. As a result of theoretical studies, the optimal value of the relative breaking strength of the thread from 16.25 sN/tex to 17.54 sN/tex, the staple length of the fiber should be more than 29.5 mm, and the number of twists should be 900 twist/meter It was determined that it should be. Based on the obtained conclusions, scientific and research work was carried out in the control enterprise. Based on the results of this research, the preliminary results of choosing the direction of further research were obtained. For this, LOTs were organized in the enterprise in various options. LOT-1 consists of Porloq-4, LOT-2 Bukhara-102, LOT-3 Sultan varieties. Based on the research results, the coefficient of variation in the linear density of yarns with different fiber content, the coefficient of variation in the number of twists, breaking strength, the variation coefficient in breaking strength, elongation at break, the coefficient of variation in elongation at break, comparison of the coefficients of variation for breaking strength and specific breaking strength were studied. When analyzing the effect of the composition of the fiber mixture on the physical-mechanical properties of the yarns for 3 LOTs, it was seen that the quality indicators of the yarns obtained from the LOT-1 mixture are higher than the indicators of the yarns obtained from other mixtures.

1. Introduction

Nowadays, not only appearance but comfort and technological advancements in clothing are expected to be fulfilled. Thus, the textile sector is trying to find ways to advance and enhance its products within the market [1]. The main tasks of the modern textile industry are considered to ensure the competitiveness of yarn; improve its image in the world market; take into account the specifics of technological processes that are carried out at high speed; determine the necessary factors to improve methods for assessing and predicting the mechanical properties of yarn with various spinning methods by taking into account the structural structure of the yarn [2, 3].

The strength of the threads is primarily responsible for the quality of textile fabric goods. The strength of cotton strands, or yarn, directly influences the quality of cotton garments, moreover, significantly affects the productivity of textile production [4]. Effective use of raw cotton in production is evaluated by the yield of spun yarn. The higher the number of yarns, the better the use of raw materials is considered [5, 6, 7].

When planning yarn quality indicators, it is necessary to take into account factors that directly affect yarn quality. The key components that influence yarn quality properties incorporate fiber quality properties, spinning technology, and working parameters of technological equipment [8, 9, 10]. The relationship between these factors plays an important role in the production of quality products [11,12].

* Corresponding author: kazakovadilafruz1976@gmail.com

Obtaining high-quality cotton fiber is crucial since the development and quality of yarn are influenced by the raw materials. Cotton production is influenced by at least three major elements and their interplay. Genotype, environment, and production procedures are examples of these. These three elements and their interaction influence yield and fiber quality potential, eventually determining the profitability of growers and processors [13].
Despite there have been hundreds of publications written on the issue of the correlation between yarn and fiber qualities exact relationship for predicting the properties of cotton yarn from those of the fiber has not been universally recognized. It has become necessary to measure more cotton fiber properties, as fiber properties play an important role in determining the type of spinning process used. Cotton fineness is more significant in the rotor than in the ring-spinning, whereas fiber length has the opposite impact. Strong rotor yarns can be made by employing low micronaire measurement (MIC) and strong cotton varieties, with fiber length and homogeneity appearing to be secondary considerations, fine and strong cotton improves yarn strength and spinning performance for both ring and rotor spinning [14].
Presently high-modernization machines and robotics system advancements in spinning technology have nearly replaced the traditional cotton spinning system by reducing time, improving productivity, and lowering overall principal cost. Through new spinning machinery, extremely efficient cotton spinning technology transformed conventional spinning technology. Modernization in spinning technologies significantly influence how efficiently, quickly, and with higher quality yarn can be produced [15].

2. Methods

It is known that the staple length of the fiber and the number of twists of the yarn affect the strength of the yarn [14, 15]. The raw material used in the spinning process, i.e. fiber, must meet certain requirements. Technological indicators of cotton fiber - physical, mechanical, geometric properties ensure the strength of the yarn obtained from it [16, 17]. Therefore, it is important to study the factors affecting yarn quality. The high strength of the spun yarn also depends on the staple length of the fiber used. Therefore, cotton fibers with different staple lengths of 28.5, 29.0 and 29.5 mm were used in the test work. Because it is advisable to use long fiber cotton fiber to get singlespun yarn for sewing threads. We can choose different twists for each option. The number of twists in 1 meter of yarn is 850, 900, 950 twist/meter. The strength of single yarns ensures the quality of the product obtained from it, so we use the above number of twists. In order to determine the relative breaking strength of a single yarn for sewing threads, experimental tests were conducted. According to the conducted experimental tests, 2 incoming factors were selected.
Fiber staple length, mm-X_1. It is known that the staple length of the fiber is one of the main parameters of the cotton fiber and affects the quality indicators of the spun yarn. It is necessary to determine the relationship between the properties of fibers and the properties of the yarn obtained from them for the correct use of fiber materials during the production of yarns at the spinning enterprise. The better the length, thinness, strength and other main properties of the fiber, the more mature and high-quality yarns are obtained from such a fiber [18, 19], and depending on their use, they have different quality indicators. That's why in the test work experiments were carried out in various variants of cotton fibers with different staple lengths of 28.5, 29.0 and 29.5 mm.
Number of twist, twist/meter-X2. The number of twists in the yarns depends on the staple length of the fiber, the linear density of the thread and the spinning system. In the experiment, the number of twists in 1 meter of yarns was 850, 900, 950 twist/meter when the single yarn spun for the production of sewing threads was 21.7 tex. This strongly affects the strength of the thread. In these experiments, we selected these indicators in 3 variants from 850 twist/meter to 900 twist/meter, from 900 to 950 twist/meter.

Table1. A condition for the adjustment of experience: The first appearance

Name, sign of the factor	Encoded symbol	Actual values of the factor			Range of change
		- 1	0	+ 1	
Fiber staple length, mm	X_1	28,5	29	29,5	0,5
Number of turns, twist/meter	X_2	850	900	950	50

Table2. A condition for the adjustment of experience: The second appearance

Name, sign of the factor	Encoded symbol	Actual values of the factor			Range of change
		- 1	0	+ 1	
Fiber staple length, mm	X_1	28,5	29	29,5	0,5
Number of twists, twist/meter	X_2	825	862,5	900	37,5

To justify the planning method, we will consider mathematical models to study the influence of fiber properties and the number of twists in providing the required strength and relative breaking strength in the yarn. For this purpose, in the experiment, we will see the effect of cotton fibers with different staple lengths of 28.5, 29.0 and 29.5 mm on the spun yarn. Cotton fibers of different staple lengths and the number of twists in the yarn were taken as input factors. The conditions of the experiment are presented in the following Tables 1 and 2.

As an output parameter, the relative tensile strength of the yarn, sN/tex (U) as input parameters, staple length of the fiber in mm and the number of twists, we study the effect on the twist/meter index based on experience. To do this, we repeated experiments 3 times in each condition based on the planning matrix. n=3 we will conduct an experiment in different conditions. In this case, the number of experiments $N \cdot n^2 = 3 \cdot 2^2 = 12$, number of repetitions m=2 given, the total number of experiments is $N \cdot n^2 \cdot m = 3 \cdot 2^2 \cdot 2 = 24$. The experimental results of the output parameter in each condition are obtained and their average values and variances are presented in Table 3, 4 and 5.

Table 3. The planning matrix is for the first

Incoming factors		Outgoing factors, U_u			Average
X_1	X_2	Y_{u1}	Y_{u2}	Y_{u3}	$Y_{o'r}$
-1	-1	15,5	15,45	15,70	15,55
1	-1	17,4	17,35	17,50	17,42
-1	1	14,5	14,7	15,00	14,73
1	1	16,2	16,25	16,30	16,25

Table 4. The planning matrix is for the second

Incoming factors		Outgoing factors, Y_u			Average
X_1	X_2	Y_{u1}	Y_{u2}	Y_{u3}	$Y_{o'r}$
-1	-1	15,7	15,95	15,7	15,78
1	-1	17,65	17,4	17,5	17,52
-1	1	14,2	14,45	14,4	14,35
1	1	16,8	16,7	16,95	16,82

Table 5. Repetition Average Cost Planning Matrix

Incoming factors		Outgoing factors, Y_u		Average	Dispersion
X_1	X_2	Y_{u1}	Y_{u2}	$Y_{o'r}$	S_u^2
-1	-1	15,55	15,78	15,67	0,0272
1	-1	17,42	17,52	17,47	0,0050
-1	1	14,73	14,35	14,54	0,0735
1	1	16,25	16,82	16,53	0,1606

Statistical exclusion of outliers is applied to each row in the table. To do this, mean values and variances are calculated for each row. These values are listed in the table. Determination of average values

$$Y_{av1} = \frac{y_{11}+y_{12}}{2} = \frac{15{,}55+15{,}78}{2} = 15{,}67$$

$$Y_{av2} = \frac{y_{21}+y_{22}}{2} = \frac{17{,}42+17{,}52}{2} = 17{,}47$$

$$Y_{av3} = \frac{y_{31}+y_{32}}{2} = \frac{14{,}73+14{,}35}{2} = 14{,}54$$

$$Y_{av4} = \frac{y_{41}+y_{42}}{2} = \frac{16{,}25+16{,}82}{2} = 16{,}53$$

Below equation shows the determination of average values:

$$y_{over.av} = \frac{y_{av1}+y_{av2}+y_{av3}+y_{av4}}{N} = \frac{15{,}67+17{,}47+14{,}54+16{,}53}{4} = 16{,}05$$

Determination of dispersion value is shown below:

$$b_{av} S^2_{1=\frac{(y1dy}{dx}}$$

$$S_1^2 = \frac{(y_{1\,av} - y_{11})^2 + (y_{1av} - y_{12})^2}{m-1} = \frac{(15{,}67 - 15{,}55)^2 + (15{,}67 - 15{,}78)^2}{2-1} = 0{,}0272$$

$$S_2^2 = \frac{(y_{2\,av} - y_{21})^2 + (y_{2av} - y_{22})^2}{m-1} = \frac{(17{,}47 - 17{,}42)^2 + (17{,}47 - 17{,}52)^2}{2-1} = 0{,}0050$$

$$S_3^2 = \frac{(y_{3\,av} - y_{31})^2 + (y_{3av} - y_{32})^2}{m-1} = \frac{(14{,}54 - 14{,}73)^2 + (14{,}54 - 14{,}35)^2}{2-1} = 0{,}0735$$

$$S_4^2 = \frac{(y_{4\,av} - y_{41})^2 + (y_{4av} - y_{42})^2}{m-1} = \frac{(16{,}53 - 16{,}25)^2 + (16{,}53 - 16{,}82)^2}{2-1} = 0{,}1606$$

Then the threshold values of the criteria are calculated with the help of formulas:

$$V_{R1\max} = \frac{y_{1\max} - y_{1av}}{S_1}\sqrt{\frac{m}{m-1}} = \frac{15{,}78 - 15{,}67}{\sqrt{0{,}0272}}\sqrt{\frac{2}{2-1}} = 0{,}8660$$

$$V_{R2\max} = \frac{y_{2\max} - y_{2av}}{S_2}\sqrt{\frac{m}{m-1}} = \frac{17{,}52 - 17{,}47}{\sqrt{0{,}0050}}\sqrt{\frac{2}{2-1}} = 0{,}8660$$

$$V_{R3\max} = \frac{y_{3\max} - y_{3av}}{S_3}\sqrt{\frac{m}{m-1}} = \frac{14{,}73 - 14{,}54}{\sqrt{0{,}0735}}\sqrt{\frac{2}{2-1}} = 0{,}8660$$

$$V_{R4\max} = \frac{y_{4\max} - y_{4av}}{S_2}\sqrt{\frac{m}{m-1}} = \frac{16{,}82 - 16{,}53}{\sqrt{0{,}1606}}\sqrt{\frac{2}{2-1}} = 0{,}8660$$

$$V_{R1\min} = \frac{y_{1av} - y_{1\min}}{S_1}\sqrt{\frac{m}{m-1}} = \frac{15{,}67 - 15{,}55}{\sqrt{0{,}0272}}\sqrt{\frac{2}{2-1}} = 0{,}8660$$

$$V_{R2\min} = \frac{y_{2av} - y_{2\min}}{S_2}\sqrt{\frac{m}{m-1}} = \frac{17{,}47 - 17{,}42}{\sqrt{0{,}0050}}\sqrt{\frac{2}{2-1}} = 0{,}8660$$

$$V_{R3\min} = \frac{y_{3av} - y_{3\min}}{S_3}\sqrt{\frac{m}{m-1}} = \frac{14{,}54 - 14{,}35}{\sqrt{0{,}0735}}\sqrt{\frac{2}{2-1}} = 0{,}8660$$

$$V_{R4\min} = \frac{y_{4av} - y_{4\min}}{S_4}\sqrt{\frac{m}{m-1}} = \frac{16{,}53 - 16{,}25}{\sqrt{0{,}1606}}\sqrt{\frac{2}{2-1}} = 0{,}8660$$

We select V_t from a special table. For this we need the values of P_d and m. P_d is equal to P_d=0.95 in industry and V_t=0.95 in the special table since m=2. Since V_t>$V_R$max, Vt>VRmin is not excluded from static processing.

Checking the homogeneity of variances is calculated using the Cochrane criterion formula:

$$G_R = \frac{S^2_{max}}{\sum S^2} = \frac{0{,}1606}{0{,}2663} = 0{,}603$$

We choose the value Gt of the Cochrane criterion table. For this, we need P_d, f=m-1 and N values. P_d in industry is P_d=0.95, and we choose f from f=m-1, taking into account N=2/n, we choose G_t in a special table $G_R<G_t$ is considered to be homogeneous.

$$G_t(P_d=0{,}95;f=m-1=1;N=4\ when)=1{,}689$$

To calculate the coefficients, we use the average values given in Table 6.

Free limit:

$$b_o = \frac{y_{1av} + y_{2av} + y_{3av} + y_{4av}}{N} = \frac{15{,}67 + 17{,}47 + 14{,}54 + 16{,}53}{4} = 16{,}0521$$

Coefficients of linear terms:

$$b_1 = \frac{y_{1av} \cdot x_{11} + y_{2av} \cdot x_{21} + y_{3av} \cdot x_{31} + y_{4av} \cdot x_{41}}{N} = 0{,}9479$$

$$b_2 = \frac{y_{1av} \cdot x_{12} + y_{2av} \cdot x_{22} + y_{3av} \cdot x_{32} + y_{4av} \cdot x_{42}}{N} = -0{,}5146$$

Coefficients of nonlinear terms:

$$b_{12} = \frac{y_{1av} \cdot x_{11} \cdot x_{12} + y_{2av} \cdot x_{21} \cdot x_{22} + y_{3av} \cdot x_{31} \cdot x_{32} + y_{4av} \cdot x_{41} \cdot x_{42}}{N} == 0{,}0479$$

Then we get the following multifactor regression model:

$$Y_R = b_0 + b_1 \cdot x_1 + b_2 \cdot x_2 + b_{12} \cdot x_1 \cdot x_2 = 16{,}0521 + 0{,}9479x_1 - 0{,}5146x_2 + 0{,}0479x_1x_2$$

But this is not the last appearance of the model.

To get the final view of the model, we check the coefficients for significance. For this, we use Student's criterion formulas.

$$S_u^2(y_{av}) = \frac{\sum S_u^2}{N} = 0{,}066563$$

$$S_u(y_{av}) = \sqrt{S_u^2(y_{orr})} = 0{,}257997$$

We select the value t_T of the table of Student's criterion. For this, we need the values P_d, $f(S^2)$=N(m-1). Taking into account that P_d is equal to P_d=0.95 in industry, we select t_T in a special table, and we select those values that are greater than the limits.

$$t_T(P_d=0{,}95;\ f(S^2)=N(m-1)=8{,}0;\ when)=2{,}306$$

$$\Delta\beta = t_T \frac{S_u(y_{av})}{\sqrt{N}} = 0{,}297471$$

Therefore, the calculated values of the coefficients are greater than the tabular value, so we remove the significant coefficients of these coefficients and exclude the remaining coefficients. As a result, we create the following model:

$$Y_R = b_0 + b_1 \cdot x_1 + b_2 \cdot x_2 = 16{,}0521 + 0{,}9479x_1 - 0{,}5146x_2$$

To check the adequacy of the obtained model, we use the formulas of the Fisher criterion. For this, we compare the experimental and calculated values of the output factor (Table 6).

Table 6. Comparison of experimental and calculated values of the factor

$y_{s't}$	y_R	$y_{s't}+y_R$	$(y_{s't}+y_R)^2$	%
15,6667	15,619	0,048	0,0023	0,3
17,4667	17,515	-0,048	0,0023	0,3
14,5417	14,590	-0,048	0,0023	0,3
16,5333	16,485	0,048	0,0023	0,3
$\sum_{n=1}^{n}$		0,00000	0,009	

So, if we consider the number of significant coefficients in the model N_k=3

$$S_1^2(y) = \frac{\sum_{n=1}^{n}(\bar{y}_u - Y_{Ru})^2}{N - N_k - 1} = 0{,}0092$$

This number $S^2(\bar{y}) = 0{,}0665625$because it is greater than the number, the calculation value of the criterion is calculated using the formula.

Fisher from the special table of the tabular value of the criterion

$$F_t=(P_D=0{,}95;\ f_1=8;\ f_2=3)=4{,}07$$

So $F_R>F_t$ the model is adequate because.

3. Result and Discussions

Encoded value +1 ва -1 according to the staple length of the fiber, +1 ва -1 is accepted in the range of the number of turns. That is, the staple length of the fiber 28,5from mm29, 5 mm interval, the number of turns825 from twist/meter950in the twist/meterrange. The influence of staple length (mm) and the number of twists (twist/meter) on the relative breaking strength of the yarn is presented in the graph (Fig. 1).

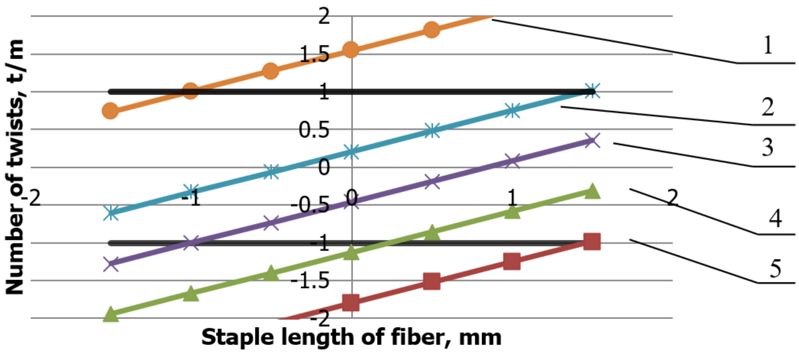

Fig. 1. Staple length of fiber (mm) and number of twists (twist/meter): dependence of the relative breaking strength of the yarn: 1. the relative breaking strength of the yarn is 17,52sN/tex; 2. the relative breaking strength of the yarn is 16,25sN/tex; 3. the relative breaking strength of the yarn is 15,62sN/tex; 4. the relative breaking strength of the yarn is 14,98sN/tex; 5. the relative breaking strength of the yarn is 14,35sN/tex

Summing up from the obtained results, the relative breaking strength of the yarn is 17.52 sN/tex when the staple length of the fiber is 29.5 mm and the number of twists is 900 twist/meter. When the length is between 28.5 mm and 29.5 mm and the number of twists is between 883 twist/meterand 936 twist/meter, the relative breaking strength of the yarn is 16.25 sN/tex, line 3 is When the staple length of the fiber is between 28.5 mm and 29.5 mm and the number of twists is between 850 twist/meterand 904 twist/meter, the relative breaking strength of the yarn is equal to 15.62 sN/tex, line 4 that the relative tensile strength of the yarn is equal to 14.98 sN/tex when the staple length of the fiber is between 29 mm and 29.5 mm and the number of twists is between 850 twist/meterand 870 twist/meter, We cannot accept because it is outside of the coded values on line 5. In order for the actual optimal value of the relative breaking strength of the yarn to be from 16.25 sN/tex to 17.54 sN/tex, the staple length of the fiber should be more than 29.5 mm and the number of twists should be 900 twist/meter.

Based on theoretical studies, research and development works were carried out at the control enterprise. Based on the results of this research, the preliminary results of choosing the direction of further research were obtained. For this, LOTs were organized in the enterprise in various options. LOT-1 consists of Porloq-4, LOT-2 Bukhara-102, LOT-3 Sultan varieties.

Research work was carried out to determine the mechanical properties of the threads and the test results are presented in Table 7.

Table 7. Fiber mixture on the physical and mechanical properties of yarns: influence of composition

Indicators	A mixture of fibers of different composition, %			
	Uster-statistics-2018 (50%)	LOT-1	LOT-2	LOT-3
The actual linear density of the yarn, tech	21,7	21,7	21,7	21,7
The coefficient of variation in the linear density of the yarn,%	1	0,9	1	1,2
The number of twists of the yarn, twist/meter	800	900	900	900
Coefficient of variation in the number of twists of the yarn,%	3,5	3,2	5,2	6,9
Tensile strength of yarn, sN	357,38	380,60	377,86	365,95
Coefficient of variation in the tensile strength of the yarn,%	12,54	6,87	7,95	7,99
Elongation of yarn at break, %	5,40	6,0	5,56	5,72
Coefficient of variation in elongation at break, %	7,15	6,30	8,24	7,44
The relative tensile strength of the yarn, sN/tex	17,00	16,8	15,7	14,5
Coefficient of variation in relative breaking strength, %	7,50	4,87	5,45	7,29

Based on the research results, Figures 2, 3, 4, 5 and 6 show the coefficient of variation in linear density of yarns with different fiber content, coefficient of variation in the number of twists, breaking strength, variation coefficient in breaking strength, elongation at break, elongation at break the coefficient of variation, specific breaking strength, and the graphs of the variation coefficient according to the specific breaking strength were presented.

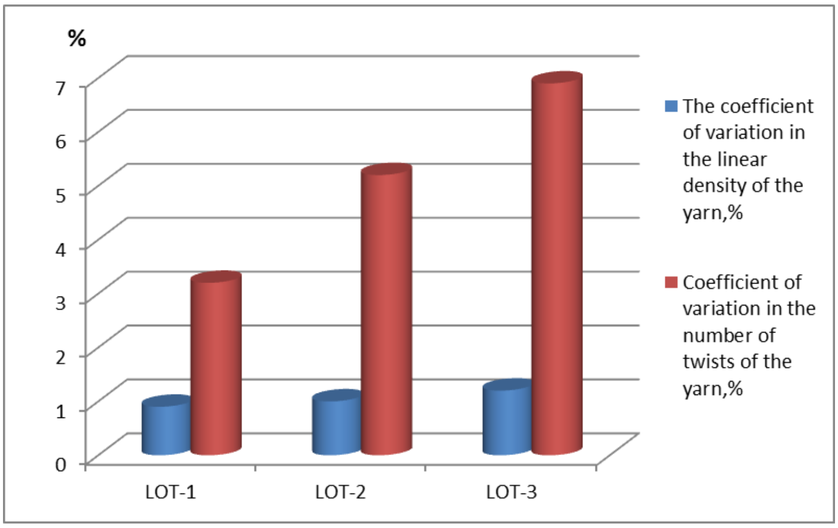

Fig. 2. Linear density of yarns with different fiber composition and change of the coefficient of variation according to the number of twists

If we compare the results of the effect of the composition of the fiber mixture on the physical and mechanical properties of the yarns with the parameters of the yarns obtained from the LOT-1 mixture, the coefficient of variation in the linear density of the yarn obtained from the LOT-2 mixture is from 1.2% to 0.9%, the twists of the yarn the coefficient of variation decreased from 5.2% to 3.2%, the breaking strength of the yarn increased from 365.95 sN to 380.60 sN, The coefficient of variation of yarn breaking strength decreased from 7.95% to 6.87%, yarn elongation at break increased from 5.56% to 6.0%, the variation coefficient of yarn elongation at break decreased from 8.24% to 6 , decreased to 30%, the specific tensile strength of the yarn increased from 15.7 sN/tex to 16.8 sN/tex, the coefficient of variation of the specific tensile strength decreased from 5.45% to 4.87%. Compared to the performance of the yarn obtained from the LOT-3 mixture, the coefficient of variation in the linear density of the yarn decreased from 1.2% to 0.9%, and the coefficient of variation in the number of twists of the yarn decreased from 6.9% to 3.2% , the breaking strength of the yarn increased from 377.86 sN to 380.60 sN, the coefficient of variation for the breaking strength of the yarn decreased from 7.99% to 6.87%, the elongation at break of the yarn decreased from 5.72% to 6.0% increased, the coefficient of variation of yarn elongation at break decreased from 7.44% to 6.30%, the specific breaking strength of the yarn increased from 14.5 sN/tex to 16.8 sN/tex, the variation coefficient of specific breaking strength decreased from 29% to 4.87%.

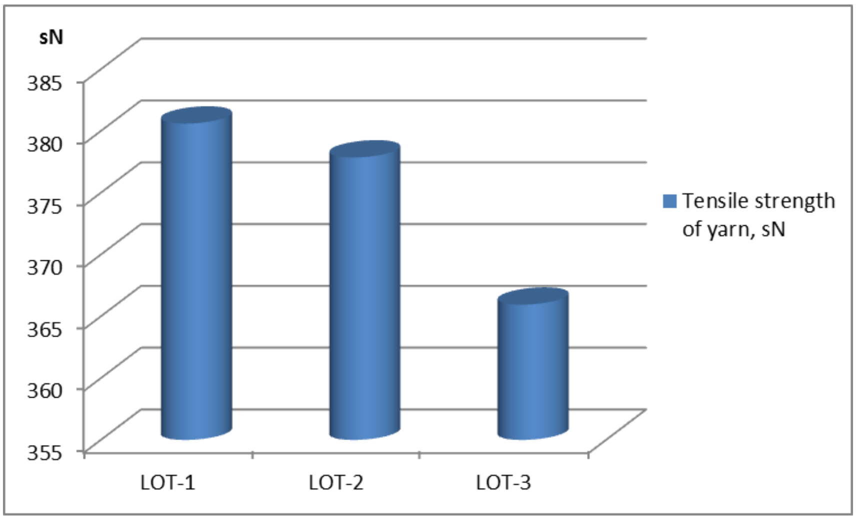

Fig. 3. Breakage of threads with different fiber composition: change in strength

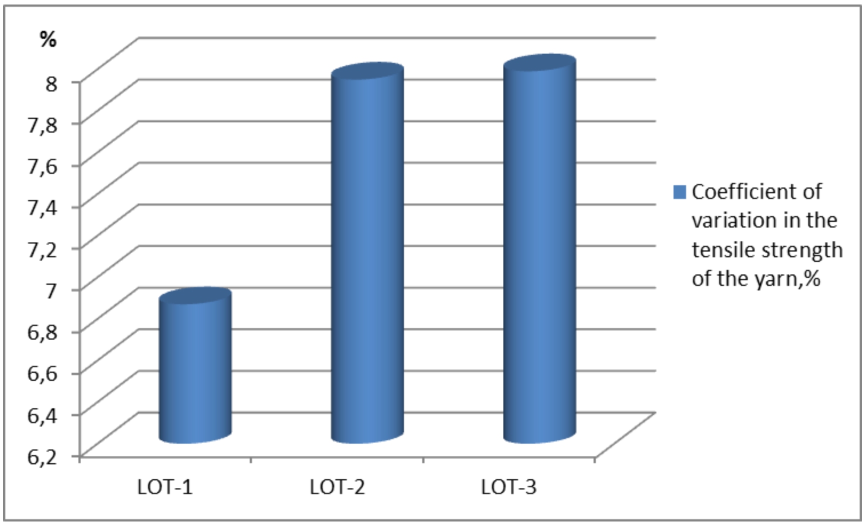

Fig. 4. Tensile strength of yarns with different fiber composition: change of the coefficient of variation according to

The physico-mechanical properties of spun yarns are intrinsically dependent on the quality of raw materials, that is, the higher the quality of the fibers, the more quality products can be produced from them [20, 21, 22]. Including, the strength of fibers is considered one of the main properties of yarn. This property of fibers is important in yarn spinning [23, 24]. In addition, the more the fibers are stretched, the higher their strength and the more durable yarns can be obtained from it [25, 26, 27].

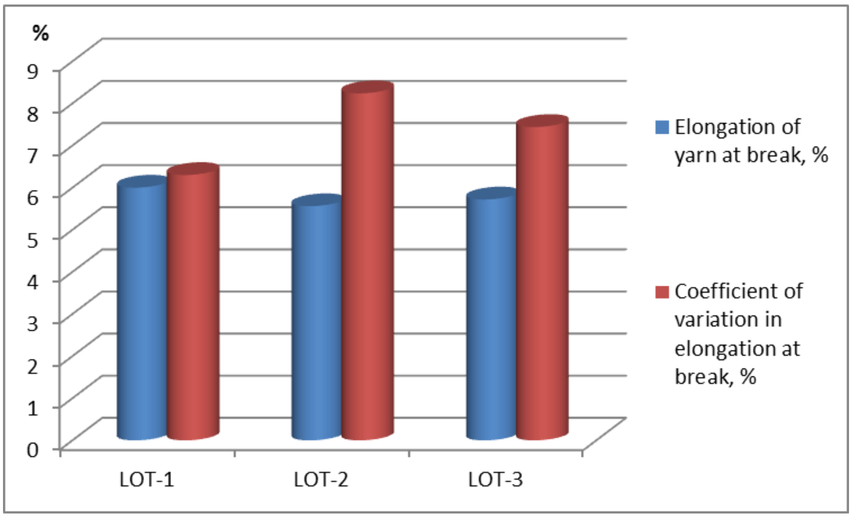

Fig. 5. Elongation at break of yarns with different fiber composition and the coefficient of variation for the elongation at break of the yarn

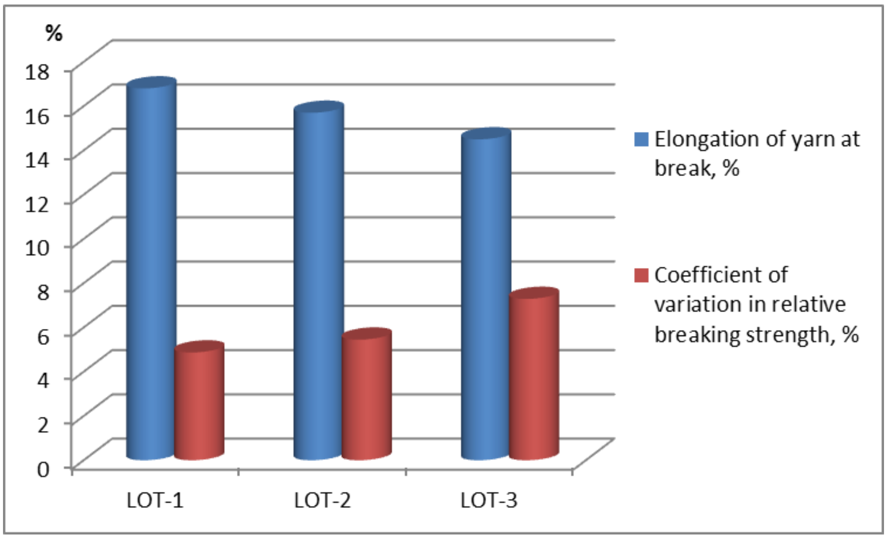

Fig. 6. Comparative breaking of yarns with different fiber composition: variation in strength and specific tensile strength coefficient change

4. Conclusions

Cotton fiber is a strategically valuable commodity for the Republic of Uzbekistan and is not exported. Over the past 10 years, the cotton fiber grown has increased the micronaire index - from 4.6 to 5.0, which makes it difficult for the quality transition of spinning production. This phenomenon is observed all over the world and requires the creation of new cotton fiber selection varieties. The new "Porloq-4" selected varieties of cotton fiber can meet the criteria required for spinning cotton fiber these days. To date, the "Porloq-4" selection is the only genetically modified crop variety with unique quality characteristics, as a result of which fibers with low linear density (microner, MIC) and longer fibers with high strength are obtained.

As a result of the conducted research, it can be concluded that the quality indicators of the yarns obtained from the LOT-1 mixture were seen to be higher than the indicators of the yarns obtained from other mixtures, and the selection variety "Porloq-4" is recommended for the production of spun yarn for sewing threads.

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