Analysis of Quality Indicators of Mixed Spun Wool Yarns

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Abstract: This article is conducted at HivaGilamlari Limited Liability Company. For this purpose, the diameter, length, strength of the fibres were determined, and for carpets, 25% wool fibre, 75% nitron fibre mixed yarns were obtained and analyzed.

1.   Introduction

In an attempt to make formatting easy, you can use the style menu just under the standard menu. Every button has a name similar to the style name in brackets after each paragraph. (Normal).

The meeting of the Cabinet of Ministers of the Republic of Uzbekistan on January 29, 2014, discussed the results of the socio-economic development of Uzbekistan in 2013 and approved the most important priorities of the economic program for 2014 [1].

Today's situation, based on the experience we have gained over the past years in combating the crisis, requires the mobilization of available resources and opportunities in order not to lose the pace of development, reform and renewal of our country. Based on these tasks, in 2013, maintaining consistently high growth rates, maintaining macroeconomic stability and increasing the competitiveness of our economy has become our top priority [2].

Nowadays, carpet yarns spun from a mixture of wool and other fibres give high yields. In our work, the experiments were carried out in the spinning shop of "Khorezm Gilamlari" LLC on spun and spun yarns with local wool fibres made of "Tora Sobir" LLC with a length of 120 mm shears, linear density 800 mtex nitron fibres in different variants [3].

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In the manufacture of carpets, more added baked yarns are used. In our research, in the spinning shop of "Khorezm carpets" LLC, three of the 107 and 131 text mixed yarns spun from a mixture of nitron and wool fibres were tested [4].

2.   Materials and methods

The strength of baked yarns is calculated taking into account the sum of the strengths of the individual yarns to which they are added and the coefficient of strength depending on the number of yarns added and their growth [5], [6].

$$P_n = \left(\sum_{i=1}^{m} P_i \right) \cdot K_e \text{ or } P_{KR} = P_{ip1} \cdot n \cdot K_k \cdot K_n, \tag{1}$$

where: P_{KR}, - breaking strength of the added yarn, cH;

P_{ip1}- single thread breaking force, cH;

n is the number of threads to be joined;

K_k is the coefficient of yarn strength;

Coefficient of change of yarn strength on K_n-yarn rewinding and finishing:

n = 3;

K_k = 1.30;

We assume that K_n = 1.0.

The relative tensile strength of the twisted yarn is determined using the formula:

$$P_{KR} = P_K / T_{KR} \tag{2}$$

The strength of complex twisted yarns is found according to the formula of M.N. Belitsin [2].

$$P = n \cdot \rho \cdot \eta \cdot K_A \tag{3}$$

where: n is the number of elementary threads;

ρ-elemental yarn tensile strength, cH;

η-element coefficient of tensile strength;

Coefficient representing the effect of K_A-yarn twist on stiffness.

These indicators are applied using test machines, tables and nomograms.

Physical and mechanical parameters were determined by standard tests in the test laboratory TITLI "CentexUz" by taking samples from the back yarn of carpets made in the production conditions of "Khorezm carpets" LLC.

The linear densities of the twisted yarns, the number of twists and the indicators of semi-circular elongation deformation, ie tensile strength, elongation at break and their composite characteristics were determined (Table 1).

Table 1: Physico-mechanical properties of yarns made of local wool and nitron fibres (mixed)

Valiant	Mixed vain composition	T, [tex]	$C_{(T)}$, [%]	Number of turns, [K,v/ts]	$C_{(K)}$, [%]	P, [sN]	R_N, [sN/tex]	$C_{(P)}$, [%]	E, [%]	$C_{(E)}$
I	Wool 25% Nitron 75%	322,2(107 tex x3)	3,4	144	4.6	2010	6.24	7.32	16.4	24.3

II	Wool 70% Nitron 30%	398(181 tex x3)	4,5	218	3.9	1499	3.77	10.58	15.9	22.7

Indicators of semi-circular elongation deformation of twisted yarns are also given in histograms (Fig. 1-2).

In the article "Application in the production of PAN fibre from an emulsion made of silkworm larvae" [6] the use of local raw materials in the preparation of emulsions by the above method, possibilities of use in the chemical industry have been studied. It was found that yarns up to 0.68-1.0 tex were processed at different concentrations to achieve a relative tensile strength of 29.4-29.7 sN/tex. It was noted that with increasing concentration, the coefficient of friction between fibre and metal decreased (h = 0.182-0.151) was detected in the instrument TKI -4-26-1. In this case, by applying the emulsion obtained from IQG in wool and semi-wool yarns in the optimal composition, it is possible to use their virginity in the weaving of carpets by the method of weaving and improve the conditions of weaving.
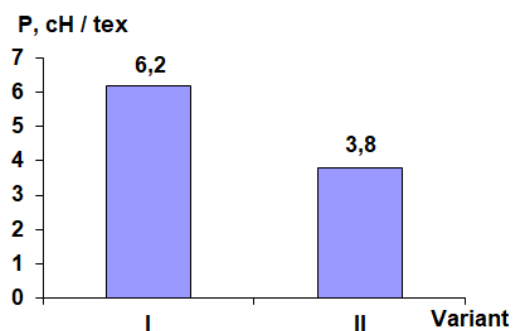

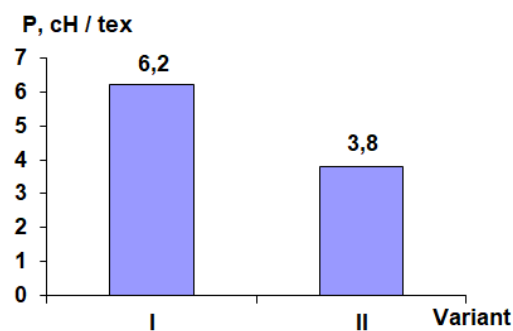Figure 1. Relative tensile strength

Figure 2. Quadratic inequality in terms of tensile strength

In the article "New drugs" BOMBYXMORI "on the basis of silkworm fungus" [7] H.Kh. Babadjanov, T.B. Murodov, A.R. the results obtained for application in make-up are discussed. Dry mushrooms contain 52% protein, 32% fat, 9% ash carbohydrates and several other substances for various technical purposes.

Due to the lack of information about the properties of the chitinous components of the sponge, research has been conducted on the method of its separation, the interaction with chemicals has been studied [8].

When processing PAN-fiber, the recommended solution temperature is 35-450C. These conditions can be accepted for the wool yarn processing solution.

The research aims to develop and test new emulsions from silkworm cocoons, sponges and their mixtures to increase the efficiency of the use of carpet backing yarns in technological processes on the loom [9], [10], [11], [12], [13].

Method of solution preparation and yarn processing. In the back yarn rewinding machine, the virginity is optimized by changing the concentration of silkworm emulsion IQG (hereinafter emulsion) depending on the proportion of wool fibre component and the degree of spinning. To do this, the linear density of the carpet backing strip, the direction of elongation, elongation is obtained unchanged according to the plan, ie (T) (K); S (Z) –const.

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The main factors:

A.Silkworm sponge emulsion concentration

1) control (without emulsion)

2) cocoon + sponge solution

3) cocoon solution

4) Experiments were conducted to prepare mushroom solution options.

B. Emulsification:

- spraying the solution

- passing the solution through the bath

C.t=50-550 C, τ=1.0 min.

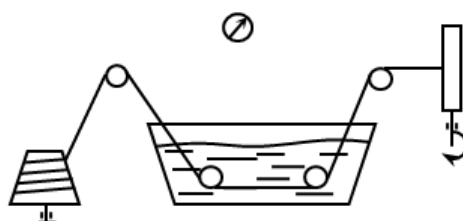TITLI XTVMS department was carried out in the laboratory (Fig. 3).

Figure 3.Preparation of the solution and yarn processing

Dry (IQG) - silkworm fungus cleaning - bleaching was performed on sodium hypochlorite, sodium chloride and hydrogen peroxide (N_2O_2) (cheap and harmless).

The ground IQG is processed and neutralized (with acetic acid) in stainless steel boilers under laboratory conditions at a certain temperature (t) and time T).

IQG aqueous solution surface tension, Concentration, IQG, the surface tension, N/m10-3, was as follows:

0,5	1,1	1,7
55	52	50

Preparation of yarn samples. Pure wool yarn T = 100 tex x 2 and wool and nitron yarn T = 100 tex x 3.

The local emulsion was prepared in 2 different variants and the yarns were processed. The yield was determined on the KM-20 instrument [10-15]].

Individual yarns of pure wool and nitron mixture with wool, as well as yarns are woven from the back of the carpet in the conditions of spinning production of "Khorezm carpets" LLC was carried out according to the following spinning plan.

Selected local wool was produced at the private enterprise "Tora Sabir".

The yarn variants were processed for one minute in modified emulsions consisting of local raw materials and their wastes prepared in the above method (A) and then dried and wrapped.

Yarn samples were quenched in accordance with GOST 106861 for 24 hours at t = 20 ± 20S and φ = 60 ± 2% under normal conditions. Physical and mechanical properties of yarns TITLI Certification Center "CentexUz" identified indicators of semi-circular elongation deformation on the dynamometer AG-6 - tensile strength, elongation at elongation, elongation and elongation diagrams. The virginity of the yarns was determined according to special instructions on the equipment KM-20-2M.

The virginity of the rope is determined by the following formula:

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$$C = \frac{K}{T_{yp}^2} \quad \text{or} \quad C = \frac{72}{T_{yp}^2} \tag{4}$$

K-coefficient. Is equal to e for the KM-20 instrument.

Often virginity is defined in conditional units. In it, the period of oscillations for 100 s is taken as the unit of virginity.

Then,

$$C = \frac{10^4}{T_{yp}^2} \tag{5}$$

Table 2: Below shows the virginity of some yarns (according to P.A. Rogov)

No.	Type of threads	Linear density, [tex]	Virginity	
			[g-crn^2 (*10^{-2})]	In conditional iniity
1.	Cotton thread	25	? 11	3,15
2	Linen strip	72	12,4	17,22
3.	Wool thread	42	6,42	8,25
4.	Raw silk thread	2,5	0,03	0,75
5.	Viscose thread	9	0.07	0.99

The virginity of the threads depends on their moisture. As humidity increases, their virginity decreases.

3.   Results

In our study, the test results are presented in Table 3, and the histograms of the main indicators are shown in Fig. 4.

Histograms of indicators of physical and mechanical properties of cocoons, cocoon-wool, wool emulsified in IQG solutions and 70% wool + 30% nitron yarn.

Table 3: The virginity of the yarns detected in the KM-20-2M instrument

| Options	Sample order, [type]	Lineal density. [tex]	The direction of growth	Tinning time, see				Virginity	P, [N]	c, [%]	E, [%]
				1	2	3	the average*				
1	100% wool yam is spun into wool and nitron recycled in cocoon + sponge solution	80.0	Z	6,94	9,3	8,67	8,3	1,04	9,12	9,8	25,4
2		95	s	5.0	5,7	5,56	5,42	2,45	28,8	1.1	27,6
3		100x3	z	4,8	5,3	-	5,04	2,8	21,9	12,1	21.8
4	treated in cocoon solution	95x2	s	7,7	8.0	6.7	7,46	1,3	18,5	6.6	29,8
5		134x3	s	5,0	4,4	4,2	4,53	3,5	19,3	0,2	19,4
6	sponge solution	116x2	s	4,5	4,3	-	4,4	7	48.11	9.8	32,1
7		108x3	z	4,5	4,5	-	4,5	3,6	24,96	5,2	24,0

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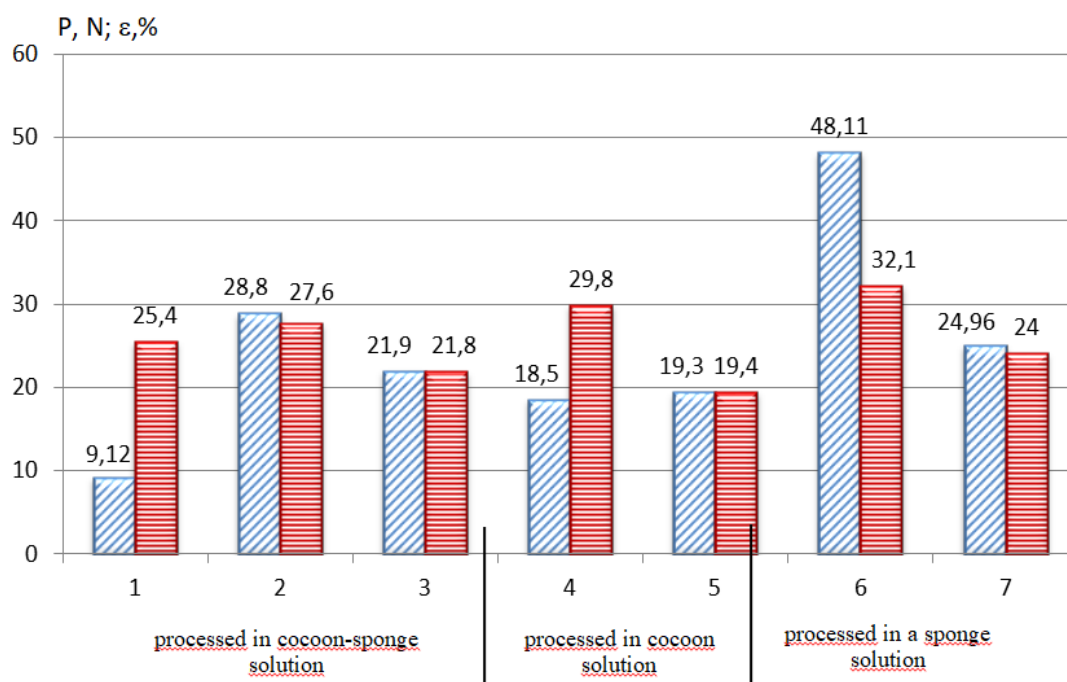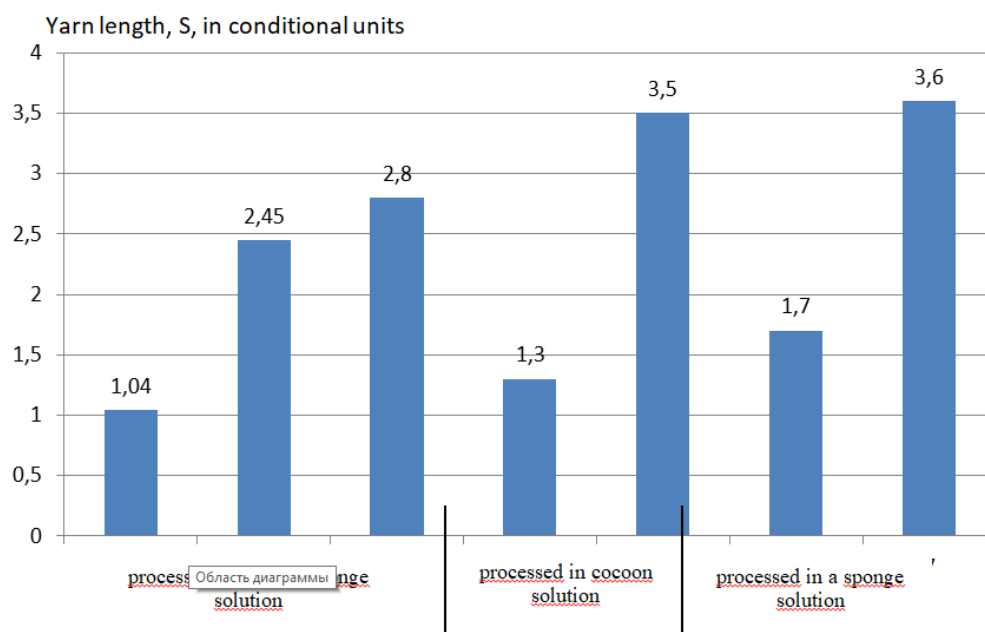
Figure 4. Tensile forces and elongation at break

Figure5. Variability of yarns in the KM-20-2M device in conventional units

From the histograms in Table 3 and Fig. 5, the strength of T = 100 tex pure wool single yarns emulsified in cocoon solution is 2 times; conditional virginity increased by 28%. According to the variants emulsified in cocoon + mushroom solution, the strength of the woollen yarn increased by 3.3N and the virginity was 2.45 conventional unit.

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4. Conclusions

Statements from the Introduction and Results sections should not be repeated here. The final paragraph should highlight the main conclusions of the study. The Results and Discussion sections may be combined.

Acknowledgement

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