| Research Article

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THE MODIFICATION OPENS UP GREAT OPPORTUNITIES TO INCREASE THE RANGE AND COMPETITIVENESS OF SILK FABRICS

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Annotation

The article presents the results of testing the tension process and research aimed at improving the preparation of threads for weaving. Attention was primarily paid to finding out the reasons for the high unevenness of tension and breakage of the threads, which contribute to the unevenness of raw silk in linear density. To reduce the breakage, we proposed a modification of silk during primary processing, which were determined experimentally. It has been revealed that polymer treatment significantly improves the physico-mechanical properties of protein fibers, these fibers initially have very good strength characteristics due to a high degree of polymerization.

Keywords: silk, modification, polymer, qualities, composition, fiber elasticity, fiber breakage, physico-mechanical properties, fibroin.

INTRODUCTION

For the successful entry of the country's economy into the international economic system, the domestic textile enterprise should produce exclusively competitive goods that would meet the requirements of the modern world market. In order to achieve an appropriate level of competitiveness of products, it is necessary to ensure control over their high quality and cost-effectiveness.

An important place in the entire domestic textile industry is occupied by the manufacture of silk fabrics. The textile industry is one of the most developed industries in Uzbekistan. The enterprises of the industry produce yarn, yarns, harsh and ready-made fabrics. The production of knitwear and sewing products has been developed: clothing and household products. The importance for Uzbekistan of the development of this sector of the economy is related to the following factors: the availability of its own raw material base of silk (cotton and wool); the textile industry is a labor-intensive industry, and, consequently, its development can contribute to solving employment problems and improving the standard of living of the population.

To do this, it is necessary to link the programs of educational institutions of the textile industry to the needs of business to a greater extent. In particular, it is necessary to introduce a system of incentives for industry enterprises to hire and train students of textile colleges and institutes and to provide them with on-the-job training. This can be done, for example, by reducing labor taxes for trainees-students of secondary specialized and higher educational institutions, or by introducing other tax incentives to stimulate the integration of the educational and production process (for example, as it is done for people with disabilities). In addition, it is necessary to introduce the practice of state support for the most promising industry specialists in the field of vocational training abroad.

In the world, the demand for improving the quality of textile fibers and the demand for natural silk products is growing day by day, and the use of polymer compositions plays an important role in their production. In this regard, the development of polymer compositions and methods for their preparation to improve the technological and structural properties of natural silk fibers, as well as the development of high-quality silk yarns and effective technologies is important.

In order to create new ranges of silk fabric products that meet the requirements of domestic and foreign markets, scientific research is being carried out in the world to develop methods for obtaining natural silk threads of a new structure with therapeutic and hygienic properties, as well as the creation and development of new modern equipment and technologies for

processing raw silk. In this regard, the determination of optimal compositions, physico-chemical and operational properties of water-soluble polymer compositions used to improve the gloss and strength of natural silk fibers, the study of the mechanism of interaction of natural silk fibers with polymer composite modifiers, giving strength to silk fabrics from high-quality natural silk fibers, as well as the creation of fabric production technology is of particular importance.

In the republic, special attention is paid to the development of the textile industry, finding ways to intensify the processing of textile materials and natural fibers, which leads to an increase in the competitiveness of finished products. The action strategy for the five priority areas of development of the Republic of Uzbekistan in 2017-2021 sets out tasks, in particular, "improving the competitiveness of the national economy, ... reducing energy consumption and resources in the economy, ... widespread introduction of energy-saving technologies into production."

Quality control involves checking the compliance of tissue quality indicators with the requirements of regulatory and technical documentation. The assessment of the quality level means the selection of a range of quality indicators, the determination of their numerical values, the selection of basic and the calculation of relative indicators. Of particular importance is the assessment of the quality level of the special fabric. In this case, the main indicator of the quality level of the fabric is its compliance with its purpose. According to the purpose of the fabric, certain indicators are selected to assess its quality. In addition, it is necessary to take into account the following indicators: operational, hygienic properties, aesthetic, technological, as well as fibrous composition and structure indicators of fabrics. The following indicators are used to determine the quality of silk fabrics :

Table 1

Indicators for determining the quality of silk fabrics

The name of the quality indicator	The standard defining the norm of indicators	The name of the characterized property
1. Surface density (g/m2)	GOST 3811	Fabric weight
2. Breaking load, N	GOST 3813	Tensile strength
3. The resulting nominal linear density of the raw material, tex	GOST 6611.1	The thickness of the thread, yarn
4. The number of threads per 10 cm, on the base and the weft.	GOST 3812	Fabric density
5. Width, cm	GOST 3811	Linear size
6. Resistance to abrasion along the plane.	GOST 18976	Wear resistance
7. Breathability, dm3/ (m2*s)	GOST 3816	Hygienic
8. Hygroscopicity, %	GOST 3816	Hygienic

For silk fabrics for household use, regardless of the fibrous composition, the general indicators are included in GOST 4.6-85 - these are width, surface density, fabric density by 10 cm. on the base and weft, breaking load, color stability in points and artistic and aesthetic indicators. Additional quality indicators, depending on the fibrous composition, include tear strength, resistance to spreading, crumbling, peeling formation, pile fixation strength, abrasion resistance, hygroscopicity, vapor and air permeability, electrification, drapery stiffness, indelibility, whiteness, transparency.

Depending on the nature of the fibrous material and their application, certain compositions and finishing methods can be used to achieve the above qualities. However, the complexity of the technology being implemented, the problems of ecology and toxicology of the final finishing process and the high cost of the reagents used limit their widespread use in production for various fibrous materials, including natural silk .

In connection with the above, we have conducted research aimed at improving the preparation of threads for weaving. Table 2 shows the results of the tension process test.

Test results of the tensioning device

Indicators	Values of indicators for the base with tension devices	
	existing	upgraded
Thread tension, cH: maximum average minimum	27 16,5 6	14 10,7 7,5
The mean square deviation, cH	4,01	1,63
Coefficient of variation,%	32,68	16,36

Attention was primarily paid to finding out the reasons for the high unevenness of tension and breakage of the threads, which contribute to the unevenness of raw silk in linear density. It is known that the average value and uniformity of the change in thread tension during rewinding determine the quality of the preparation of the basics for weaving [3].

The main reason for the increased discontinuity during the passage of the thread through the galev eyes are dynamic strikes on the maximally stretched threads from the lower and upper parts of the galev eye. To reduce the breakage, we proposed a modification of silk during primary processing, which were determined experimentally.

Therefore, it can be assumed with high probability that the application of solutions of water-soluble polymers and keratin contributes to the densification of the structure of fibroin macromolecules and its secondary formations in the protein iber, especially in damaged areas of the fiber (Fig.1).

1-the original fiber,   2- after processing composition
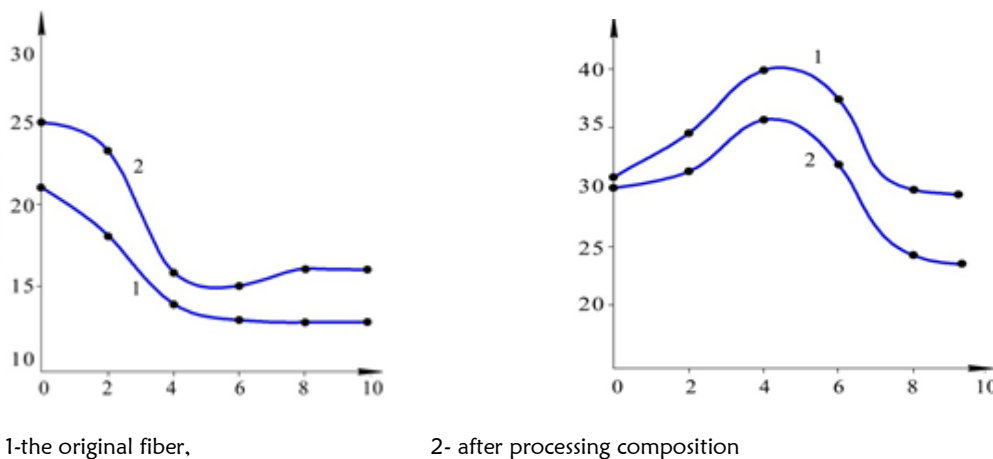
Fig. 1. Changing the technological properties of fibers

Due to the fact that processing with a polymer composition significantly improves the physical and mechanical properties of protein fibers, these fibers initially have very good strength characteristics due to a high degree of polymerization. But, in the process of processing into products, internal stresses arise in them, which can negatively affect their resistance to various types of mechanical loads .

Due to this, silk fibers, fabrics and products made from them do not crumple during operation. At the same time, the elasticity of the fiber of the modified natural silk becomes several times better, for example, than the original one

(Table 3).

Quality indicators of fabrics of new structures made of natural silk

Polymer concentration,%	Option / It relates. indicators	Показатели								
		Breaking load kN		The spreading capacity of the dvN		Hardness of microns/cm2		Abrasion resistance	Thickness, mm	Breathability
		o	y	o	y	o	y			
1-1,5	option	12,6	9,0	2,0	1,8	2020	455	2990	0,58	180
	It relates. indicators	2,5	2,5	1,0	1,1	2,0	1,3	1,2	1,2	1,2
1,5-2,0	option	9,0	7,5	2	2	1386	450	2370	0,42	160
	It relates. indicators	1,8	2,1	1,0	1,0	1,4	1,4	0,9	0,8	1,1
2,0	option	8,5	6,5	2,3	1,8	839	652	3770	0,45	180
	It relates. indicators	1,7	1,8	0,9	1,1	0,8	1,6	1,5	0,9	1,2
2,5	option	9,0	5,0	1,8	2,0	1197	702	959	0,44	210
	It relates. indicators	1,8	1,4	1,11	1,0	1,1	1,8	0,4	0,9	1,4
3,0	option	8,5	6,0	1,6	1,8	661	986	1808	0,46	200
	It relates. indicators	1,7	1,7	1,3	1,1	0,7	2,5	0,7	0,9	1,3
3,5-4	option	16,0	8,0	1,2	1,6	1800	900	3500	0,65	130
	It relates. indicators	1,6	2,2	1,7	1,3	1,8	2,3	1,4	1,3	0,9

It has been established that the presence of various multifunctional groups in the chemical structure of the polymer composition reduces the breakage of the fiber and improves the physico-mechanical properties of silk, providing improvements in hygroscopic properties while maintaining a complex of operational properties.

And so, it can be noted that the modification of silk with a composition based on a water-soluble polymer and keratin opens up great opportunities to increase the range of fabrics for the national clothing of Uzbekistan, including Central Asia.

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