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Research Article

TECHNOLOGY FOR OBTAINING BIOCOMPONENT YARN FROM NATURAL SILK WASTE

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ABSTRACT

The paper presents the results of a study on the development of technological parameters for the preparation of blended yarn from cotton fibers and secondary waste of natural silk. A new technological chain for the production of mixed yarns in modern cotton spinning equipment is given, taking into account their technological capabilities, as well as physical, mechanical and technological indicators of the resulting new mixed yarn. Also, the indicators of filling the loom, which received the fabric, are given. In conclusion, the physical and mechanical indicators and the results obtained in the certification laboratory of the institute are given.

KEYWORDS

The loom, the fabric, the physical and mechanical indicators.

INTRODUCTION

Silk is the most valuable textile raw material of animal origin. Natural silk is characterized by high physical and mechanical, sanitary and hygienic, beautiful appearance, pleasant matte sheen, high strength, elasticity and water absorption, thus providing valuable textile raw materials.

Uzbekistan is the birthplace of silk fabrics, like the well-known khan-atlas and snipes. These fabrics are successfully used in all areas of life, and are also used to decorate modern interiors. Cool sliding silk saves from the scorching southern sun. With Uzbek fabrics you will be associated with the most pleasant

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memories of Uzbekistan. In the silk industry, in particular at silk-reeling factories, various fibrous wastes are generated. Many works are devoted to the rational use of waste generated in cocooning, but there are no developments on the use of such a type of waste as silk tow.

Noil processing is a very complex and time-consuming process. The main reason for this is the lack of an effective method of processing waste due to the seemingly positive quality of this wonderful textile raw material - its high strength, which requires a special technology for processing when mixing, stapling [1].

Organization of the Text

The object and method of research is the preference given today to mixed fabrics made from a mixture of natural and chemical fibers, since in terms of wear resistance they are ahead of fabrics made only from cotton fibers. Fabrics made from natural blended fibers have very high physical, mechanical and technological performance. In addition, fabrics made from blended yarns have positive parameters, such as shape stability and long-term color retention even after repeated washes.

When sorting cocoons according to high levels of silk-bearing breeds and hybrids, the yield of defective cocoons is 6-12% of the total mass of cocoons. Table 1 shows the yield of defective cocoons.

1-Table

Name of defective cocoons	Quantity, [%]
Twin cocoons	1-3
Ugly cocoons	0.1-0.2
Crumpled cocoons	1.7-2.4
Spotted cocoons	0.9-1.7
Capercaillie cocoons	0.6-1.1
Unfinished	0.4-0.9
Thin-walled	0.4-0.7
Leaky	0.2-0.4
Other defective cocoons	0.7-1.6
Total:	6-12

Output of defective cocoons.

These values vary by breed and cocoon hybrid. Despite the fact that various scientific works have been carried out in the field of silk spinning, the lack of technology for creating a new range of mixed two-component yarns remains relevant, as well as the problem of researching and improving their methods. Due to the fact that the length of the fibers for the production of cotton-silk yarn should be 32-36 mm, as well as the length of secondary waste from carding machines at silk mills is different, therefore, the study first analyzed

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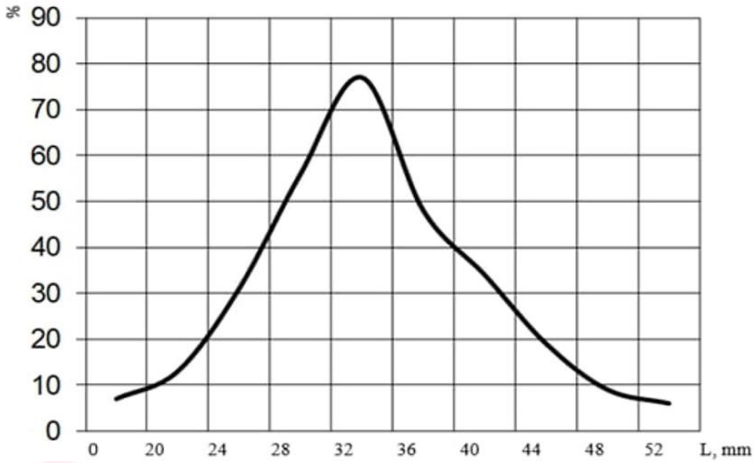
the length of the fibrous waste of fibers generated at the silk spinning enterprise. As can be seen from the graph (1-Fig.), the main part is the proportion of fibers with a mass length of 28-40 mm [2].



1-Rice. Staple length analysis of fibrous natural silk waste.

The fibrous silk waste formed during the spinning process has a number of advantages, such as strength, its length compared to cotton fiber. Cotton fiber also has a number of properties, such as elasticity, adhesion, high breathability. Table 2 shows the properties of fibrous waste of natural silk and cotton fiber.

2-Table

Fiber properties	Cotton fiber		Natural silk fiber (secondary waste)
	medium	fibrous finely fibrous	
Length, [mm]	28-35	35-45	32-47
Linear density, [tex]	0.15-0.18	0.12-0.16	0.16-0.33
Specific breaking load [cN/tex]	23.0-27.8	30-35	38-40
Elongation at break, [%]	4-7	5-8	14-18

Properties of cotton and silk fibers.

Based on the analysis of the above data, it was found that it is possible to obtain yarn by mixing silk fibers with cotton fiber.

The process of preparing natural fiber waste for blending consists of complete loosening and separation of the fibrous mass, thorough cleaning of weeds and removal of various contaminants. When

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mixing waste, the fibers of each component must have a uniform distribution over the entire volume and length, which will make it possible to develop a uniform mixed thread along its entire length. When evaluating the quality of a thread, an important role is also played by a stable proportion of components along its length. Despite the fact that silk waste is one of the components of mixed threads, they have high hygienic properties and low cost, since these wastes are, in essence, natural fibers. Each indicator of the component has a different degree of influence on the property of the mixed thread. The correct selection of the components of the mixture is the first condition for the successful joint processing of cotton and silk.

Cotton fiber and fibrous natural silk waste go through the processes of separate loosening, mixing, cleaning, combing and a tape was formed, then a blended yarn was obtained on the HSR-1000 tape machine by mixing.

In the research work, it was planned to mix cotton fiber with waste silk fibers in a tape form, according to the established technological parameters on a tape machine HSR-1000. The prepared individual tapes were mixed together in 4 variants (3-Table).

3-Table

Type of raw material	Quantity mixing of components, %			
	I-variant	II-variant	III-variant	IV-variant
Cotton fiber	87.5	75	62.5	50
Fibrous waste of natural silk	12.5	25	37.5	50

Quantity of mixing cotton fiber with natural silk fiber waste

Cotton fiber and fibrous waste of natural silk go through the processes of separate loosening, mixing, cleaning, combing and forming a tape, then on the HSR-1000 tape machine, by mixing the options presented in Table 3, according to the recommended sequence of technological processes, yarn was obtained from mixed components. Taking into account the technological capabilities of modern equipment, which is installed in the training and production laboratory of the institute, it was proposed to obtain a mixed thread using a new technological chain [3]. According to the developed technology, cotton-silk yarn was obtained and its physical and mechanical properties were studied in the CANTEXUZ certification laboratory at the institute.

The table shows that the high strength characteristics of natural silk affected the improvement of the physical and mechanical properties of cotton-silk yarn.

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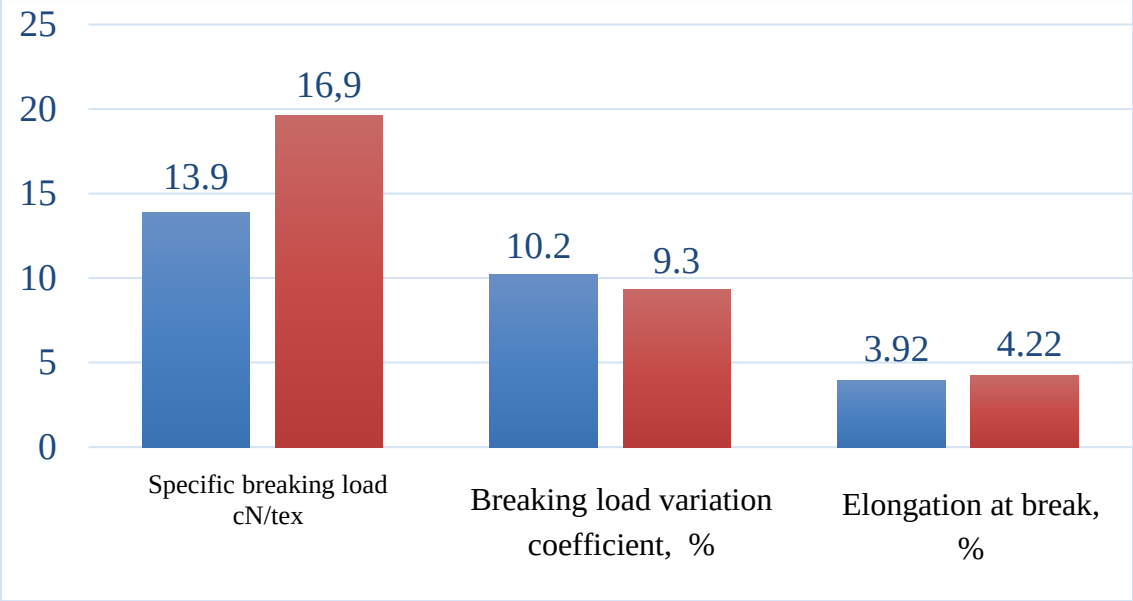

2-Rice. Comparative histogram of the physical and mechanical properties of cotton-silk yarn.

Analyzing the above indicators, we can draw the following conclusions that all technological indicators of yarn obtained from the cotton-silk mixture are high, and the quality indicators, which are one of its main classifications, are 1.71.

CONCLUSIONS

When using secondary waste of natural silk mixed with cotton, the cost of yarn is reduced. An important factor is that hitherto unused silk tow can be successfully used as a raw material mixed with cotton for the production of high-quality blended yarn. The use of secondary fibrous waste of natural silk mixed with cotton not only significantly expands the raw material base of the textile industry, but also makes it possible to produce a variety of fabrics and knitwear. Improving the efficiency of industrial production, increasing the output of competitive consumer goods requires the rational and maximum use of the richest raw materials, bringing them to the level of finished products, which will ultimately lead to a decrease in imports and an increase in exports of finished products. Also, the development of technologies for the production of mixed threads leads to an increase in the efficiency of using local raw materials and the improvement of waste-free technology.

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