Change in the Indicators of the Uneven Roving Obtained from a Mixture of Silk Waste

Ochilov Tulkin Ashurovich, Axmedov Jahongir Adxamovich, Valieva Zulfiya Fakhritdinovna, Shumqorova Shamsiya Pulatovna, Yodgorova Xilola Isroilovna

Abstract: In this article, there were defined the indicators of unevenness of roving acquired from the following mixture in three types: cocoon flocks 40% + canvas I-pass 35% + canvas II -pass 25%, cocoon flock 30% + canvas flock 25% + canvas II-pass 25% + 20% + cocoon flock 20% + canvas I-pass 20% + canvas II-pass 20%+canvas A-pass-30% with modern equipment at Joint Venture "Silver Silk". The unevenness of the rovings was determined on a modern Uster-Tester-5 instrument and, based on the results, the optimal mixed waste composition was recommended.

Keywords: cocoon, silk, unevenness, roving, spinning, yarn, mixing, quality, cocoon flock

I. INTRODUCTION

Uzbekistan pays a great attention to improving the economic performance of cocoon production and processing. One of the most important issues of industrial production today is an increase in efficiency through the quality indicators, which determines the social and economic development of the future. Therefore, the effective use of existing techniques and technology requires new approaches to product quality management [1].

Peoples of Central Asia for centuries have been extensively using natural silk and its products. These textile materials are used to meet human needs.

Silk-spinning mills as a waste raw material - use the waste from cocoon-winding plants – string, peel, canvas of the I and II-pass, broken silk, non-sorted and non-standard cocoons, defected cocoon raised from the cocoon initial processing unions, as well as seed growing cocoons [2].

After arrival of raw materials to the warehouse, the laboratory staff will determine the quality indicators. Key quality indicators include levels of contamination with foreign impurities, fat content, sericin content and actual moisture content. By the end of the laboratory, raw material treatment plans are developed and processed according to this plan. Inadequate performance of spinning products is often adversely affected by the technical and economic performance of the enterprise and the physical and mechanical properties of the yarn. It is important to test and control the inadequacy of raw and finished products in the spinning industry and identify the causes and timing of the discrepancies. The more yarn interruptions in spinning and molding, the greater the unevenness of the yarn. As a result of the ropes breakage, the employment of the workers will increase as well as the decrease in the productivity of the machines [3]. Unevenness of products, acquired in the enterprise may be different, such as unevenness in linear density, in strength, inadequate corrosion, and so on. In the production of yarn in spinning factories, the composition of silk waste in the mix is important. For example, a degree of unevenness in combing machines is not the same as during the processing, that is, a degree of purification and separation of silk fibers from waste. It also causes the formation of uneven combs/roving. Different machine extensions include products that are uneven in product structure or linear density, and vary the area of tensile strength and friction force. Unevenness affects the technical and economic performance of the work, as well as physical and mechanical properties of spinning and weaving products. Many factors, such as unevenness of raw materials, are often the result of technological processes and machine design, disruptions in the working regime, and the distance and repair of workers from machines [3].

The dissolution of silk fibroin in highly concentrated neutral salt solution and the subsequent long time-costing desalination have long inhibited silk regeneration [4]. Analyzing sparse products is a complex process. There are many types of inequalities for spinning products, such as the formation of the first spinning phase and the subsequent changes and adding new types of inequalities. Thinning of yarn, including a number of components, affects the various stages of spinning in the production of spinning. Different types of irregularities are interconnected. These factors make it difficult to change the causes of inequality. Therefore, the rate of inequality of yarn produced by spinning enterprises depends, first of all, on the composition of the compound [5].

Silk sericin has been studied for application in the biomedical and cosmetic fields, given its good water retention and wound-healing properties. Although sericin can be obtained by extraction in hot water, this leads to molecular degradation [6].

Revised Manuscript Received on May 15, 2020.

***** Correspondence Author

Prof. Ochilov Tulkin Ashurovich, Faculty Technology of light industry and design, Tashkent Institute of Textile and Light Industry, Uzbekistan

Dr.Sci.Tech. Axmedov Jahongir Adxamovich, Department of "Technology of silk", Faculty Technology of light industry and design, Tashkent Institute of Textile and Light Industry, Tashkent, Uzbekistan

Senior teacher Valieva Zulfiya Fahritdinovna, Faculty Technology of light industry and design, Tashkent Institute of Textile and Light Industry, Uzbekistan, E-mail: zulfiya-valieva-76@mail.ru

Senior teacher Shumqorova Shamsiya Pulatovna Faculty Technology of light industry, Jizzakh polytechnic institute, Jizzakh Uzbekistan

Senior teacher Yodgorova Xilola Isroilovna Faculty Technology of light industry, Jizzakh polytechnic institute, Jizzakh, Uzbekistan

In order to investigate the influence of twist, the mechanical properties of silk yarns acquired from the same manufacturer were studied; the quality and number of strands of silk yarns were assessed by comparing the strength and elongation of silk fibre and yarn. The results indicate that silk yarn has less strength than fibre, whose strength utilization coefficient for the fibre in the silk yarn was only 70%. However, the unevenness of the mechanical properties is more moderate than the fibre [7].

The thread control device in a stretched state and undergoes a certain deformation and is wound on the reel in a wet condition. As the drying of raw silk yarn tension increases.As a result of investigations it was found that the thread tension before laying on the reel more than 8 cN, elongation at break of the filament is reduced significantly [8].

Silkworm fibers have attracted widespread attention for their superb glossy texture and promising mechanical performance [9-10].

In order to explore the effect of condensed spinning method on the yarn properties, the pure cotton yarn with 28. 1, 18. 5 and 14. 7 tex was spun by four kinds of condensed spinning methods based on traditional ring spinning such as four, roller lattice apron compact spinning, compact siro spinning, complete condensed spinning and low torque spinning. The breaking strength, breaking elongation, hairiness and evenness of the pure cotton yarn were tested and analyzed, and the reasons for the influence of four kinds of condensed spinning methods on yarn performance were explored. The experimental results show that the characteristics of the yarn structure by different condensed spinning methods will influence the inner properties of the yarn. The yarn spun with compact siro spinning has the highest strength, the yarn spun with complete condensed spinning has the most beneficial hairiness. The yarn quality of the low torque yarn is better under the effect of the false twister. It has the best evenness, and the yarn spun with compact siro spinning has the lowest total hairiness [11].

The paper discusses the structure-property relationship of DREF-3 friction spun cotton yarns in which the core is a single twisted cotton ring yarn and the sheath is made of the same cotton fibres The structural changes in the single staple fibre yarn when subjected to DREF-3 spinning have been studied by using tracer fibres. The single yarn physical properties, namely its count, twist and twist direction, and the proportion of the sheath fibres usedduring spinning have been correlated to final DREF yarn mechanical properties. It was found that the direction of single yarn twist has most significant effect on all mechanical properties. Also the amount of twist, proportion of sheath wrapping changes the tensile properties [12].

II. METHODOLOGY

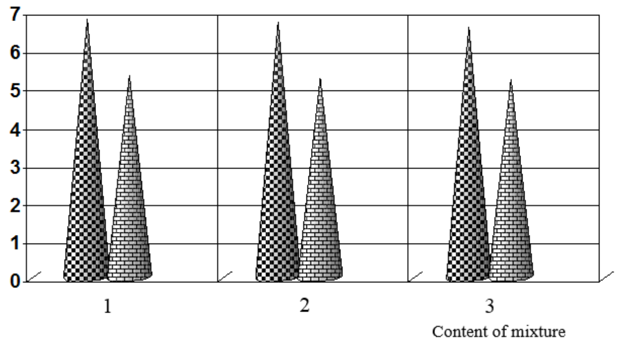
Therefore, a spinning company has been researching to produce quality yarn. For this, there are three types of cocoon flocks 40% + canvas of I-pass 35% + canvas II-pass 25%, cocoon flock 30% + canvas I-pass 25% + canvas II-pass 25% + cocoon flock 20% and cocoon flock 30% + canvas I-pass 20% + canvas II-pass 20% + canvas A-pass 30% were defined on modern equipment.

The results of the tests are presented in Table 1.

Based on the results of Table 1, Figure 1-3 presents the bar graphs of spinning processes, 1 m mass discrepancy, 3 m mass discrepancy, 1 m maximum mass, and 3 m maximum mass variations of different silk emissions.

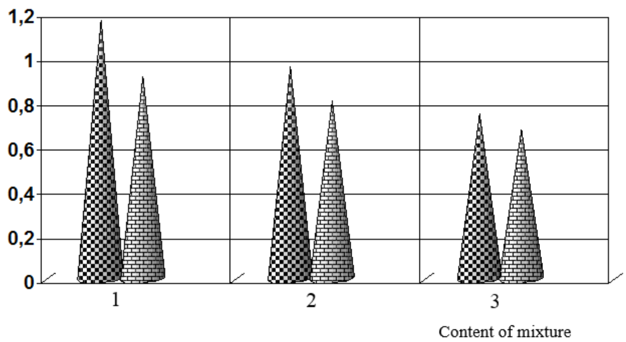
Table-1 Effect of unevenness indicators of roving from mixtures of different silk waste

O/n	Content of mixture	Linear unevenness, U_m,%	Unevenness on 1 m mass CVm, 1 м	Unevennes on 3 m mass CVm, 3 м	Maximal mass in 1 m m(max,1 м)	Maximal mass in 3 m m(max,3 м)
1.	Cocoon flock 40%+canvas I-pass 35%+ canvas II-pass 25%	7,80	6,74	5,28	1,16	0,91
2.	Cocoon flock 30%+ canvas I-pass 25%+ canvas II-pass 25%+cocoon cut 20%	7,65	6,68	5,20	0,95	0,80
3.	Cocoon flock 30%+ canvas I-pass 20%+ canvas II-pass 20%+ canvas A-pass 30%	7,59	6,55	5,16	0,74	0,67



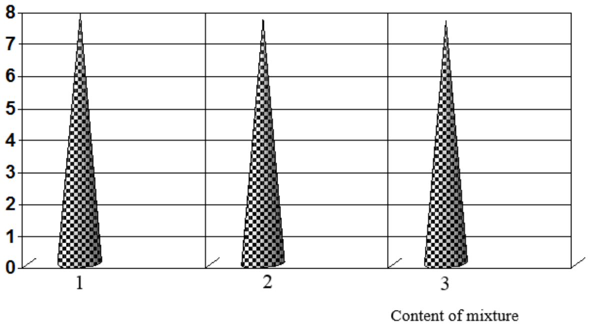
Picture-1. Effect of unevenness indicators of roving from mixtures of different silk waste on mass 1m and 3 m

- unevenness on mass 1 m;
-unevennes on mass 3 m



Picture-2. Effect of unevenness indicators of roving from mixtures of different silk waste on max.mass 1m and 3 m

- unevenness on mass 1 m;
-unevennes on mass 3 m



Picture-3. Effect of linear unevenness indicators of roving from mixtures of different silk waste

In order to investigate the influence of twist, the mechanical properties of silk yarns acquired from the same manufacturer were studied; the quality and number of strands of silk yarns were assessed by comparing the strength and elongation of silk fibre and yarn. The results indicate that silk yarn has less strength than fibre, whose strength utilization coefficient for the fibre in the silk yarn was only 70%. However, the unevenness of the mechanical properties is more moderate than the fibre. According to analysis of variance (ANOVA), it is observed that yarn twist, silk quality and the number of strands have a significant effect on the strength and elongation, which are more obvious in yarn with a heavy twist. The results indicate that, the larger the twist coefficient, the lower the yarn strength and elongation, and the stronger the yarn unevenness rate. In addition, the higher the quality grade of the silk, the higher the strength and elongation of yarn. Due to the double-stranded silk yarn broken at different times, the strength of the silk strands visibly declined [5].

III. RESULTS AND DISCUSSION

Analyzing the results of the test, we compare the cocoon flock with 40% + canvas I-pass 35% + canvas II-pass 25% + cocoon flock 25% + canvas I-pass 25% + canvas II-pass 25% + linear unevenness of roving obtained from a mixture of 20% of cut cocoon by 2.0%, 0.9% by 1 m of mass, 1.5% by 3 m of mass, 18.1% by 1 m, mass linear inhomogeneity of roving obtained from mixtures with a maximum mass of 12.1% and cocoon flock 30% + canvas I-pass 20% + canvas II-pass 20% + canvas A-pass 20% + 1 m mass non-uniformity decreased by 2.8%, 3 m of mass disorder by 2.3%, maximum mass per 1 meter by 36.2%, maximum mass at 3 meters by 26.4%. Results of the study demonstrate that the cocoons of cocoon flocks 30% + canvas I-pass 20% + canvas II-pass 20% + canvas A-pass 20% + canvas A-pass 30% mixtures is found to be lower than that of silk mixed with other silk wastes.

IV. CONCLUSION

Results of the study show that the linear inhomogeneity of the cocoon flock is 30% + canvas I-pass 20% + canvas II-pass 20% + canvas A-pass 20% + canvas Apass 30% + 1 m mass inhomogeneity from 0,9% to 2,8%, 3 m of mass discrepancy from 1,5% to 2,3%, maximum mass per 1 meter - from 18,1% to 36,2%, maximum mass at 3 meters - 12, 1% to 26.4% cocoon flock 40% + canvas I-pass 35% + canvas II-pass 25% + and cocoon flock 30% + canvas I-pass 25% + canvas II-pass 25% + cut cocoon 20 %, have the lower unevenness indicators than roving obtained from such mixtures.

REFERENCES

1. Rubinov E.B. Silk technology. Cocoon winding. -M: Light and food industry, 1981.-392 p.
2. Abdullaev U.A. The effect of duration and storage of natural silk fibrous waste before boiling on their quality // J. Silk. -1983. - No. 3.-B. 24-26.
3. Alimova H.A., Khikmatullaeva M.R., Shamukhitdinova L.Sh., Aripjonova D.U. Technology for the preparation of raw materials and the quality of silk fabrics for a new range of clothing // J. Textile Industry. Moscow.-2002. - No. 9.
4. Wang, H.-Y., Zhang, Y.-Q., Wei, Z.-G. Excess acetone extraction in silk protein solution greatly accelerates the regeneration progress of silk fibroin for desalting and purification. 2020. International Journal of Biological Macromolecules 146, c. 588-595.
5. Tang, J.-Y., Wang, Y.-P., Chen, X., Yang, R. Analysis of the tensile property of silk filament yarn. Textile Bioengineering and Informatics Symposium Proceedings 2019 - 12th Textile Bioengineering and Informatics Symposium, TBIS 2019 c. 777-783.
6. Kim, S.J., Um, I.C. Effect of Silkworm Variety on Characteristics of Raw Sericin in Silk. 2019. Fibers and Polymers 20(2), c. 271-279.
7. Tang, J.-Y., Wang, Y.-P., Chen, X., Yang, R.. Analysis of the tensile property of silk filament yarn. 2019. Textile Bioengineering and Informatics Symposium Proceedings 2019 - 12th Textile Bioengineering and Informatics Symposium, TBIS 2019 c. 777-783.
8. Kaldybaev, R.T., Kaldybaeva, G.Y.U., Tolesh, Z.H., Togataev, T.U.. Investigation of yarn tension in the process of primary processing of raw silk. 2019. Izvestiya Vysshikh Uchebnykh Zavedenii, Seriya Teknologiya Tekstil'noi Promyshlennosti 2019-January(1), c. 157-159.
9. Xu, H., Yi, W., Li, D., (...), Hou, J., Hou, X. Obtaining high mechanical performance silk fibers by feeding purified carbon nanotube/lignosulfonate composite to silkworms. 2019. RSC Advances 9(7), c. 3558-3569.
10. Xiang, Y., Yin, R., Tao, X. Novel silk single yarns spun on cotton spinning frame fiber Society 2019 Spring Conference - Renaissance of Fibers and Fibrous Materials: Science, Technology, Fashion, and New Applications c. 44.
11. Shen, M., Xu, B., Liu, X., Su, X., Cao, X. Influence of condensed spinning method on yarn property. 2018. Journal of Silk 55(9), c. 21-26.
12. Ryan, J.D., Lund, A., Hofmann, A.I., (...), Weisenberger, M.C., Müller, C. All-Organic Textile Thermoelectrics with Carbon-Nanotube-Coated n-Type Yarns. 2018. ACS Applied Energy Materials 1(6), c. 2934-2941.

AUTHORS PROFILE

Prof. Ochilov Tulkin Ashurovich, Faculty Technology of light industry and design, Tashkent Institute of Textile and Light Industry, Uzbekistan

Dr.Sci.Tech. Axmedov Jahongir Adxamovich, Department of "Technology of silk", Faculty Technology of light industry and design, Tashkent Institute of Textile and Light Industry, Tashkent, Uzbekistan

Senior teacher Valieva Zulfiya Fahritdinovna, Faculty Technology of light industry and design, Tashkent Institute of Textile and Light Industry, Uzbekistan, E-mail: zulfiya-valieva-76@mail.ru

Senior teacher Shumqorova Shamsiya Pulatovna Faculty Technology of light industry, Jizzakh polytechnic institute, Jizzakh Uzbekistan

Senior teacher Yodgorova Xilola Isroilovna Faculty Technology of light industry, Jizzakh polytechnic institute, Jizzakh, Uzbekistan