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STORAGE PROCESSES TO TECHNOLOGICAL CHARACTERISTICS OF COCOD SHELL IMPROVEMENT

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Abstract
The research conducted shows that in recent years, the sericulture industry, including the processes from silkworm farming to the production of silk products, and the equipment used in these processes, have been improving. Currently, to ensure the continuous operation of sericulture enterprises, silkworms are stored in the warehouses of silkworm breeding enterprises. Although this may seem like a simple situation, it is of great technological significance. This is because during storage, the silkworms are exposed to environmental factors, metrological conditions, various pests, and other factors, leading to the disruption of the structure of the silkworm layers, damage to the silk layers, and the aging of sericin. Experiments have shown that when the storage period exceeds 11-12 months, raw silk yield decreases by 6.5%, the silk's flexibility decreases by 7.1%, and as a result, during the spinning process, the loss in output increases by 1.6%, while the recovery rate increases by 1.3%.
Objective. Increasing the efficiency of the raw silk production, cocooning and cocooning industries is largely dependent on the processes of preserving the natural properties of the cocoon and the technological properties of the cocoon shell. Although this may seem simple in appearance, it is of great importance for technological processes. Because during the technological processes of cocoon production and its processing and storage, dust in the air affects the cocoon and cocoon shell, causing contamination of the cocoon shell and changing its physical

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and chemical properties and characteristics. The dust in the cocoon shell consists of complex fractional substances, which consists of fine silk fibers, mulberry leaves and crushed parts of dried branches of plants used as stalks. 60-65% of the dust consists of particles with a size of up to 0.05 mm, and the remaining 35-40% are particles with a size of 0.01-0.04 mm. In addition, the dust composition consists of 40-42% minerals and 58-60% organic substances, and its composition also contains 1.7% silicon dioxide, which is considered dangerous to human health. The cocoon is aimed at the proper organization of storage processes based on the characteristics of the cocoon and shell in the cocoon storage facilities.

Methods. In the technological processes of storing cocoons, wet and dry cocoons, the effect of dust and other small particles in the air on the cocoon and cocoon shell is still preserved. This is because the cocoons grown on farms are transferred to TPs and transferred to the bases of the received wet cocoon, and the cocoon is stored in the open for 1-3 days, spread out on the ground. As it is known from the preliminary research work on determining the amount of dust and other small particles retained in the cocoon shell, it was found that the dust and other particles in the cocoon shell are 0.1% or more by weight of the cocoon, and the effect of storage time and conditions on the properties of the cocoon and cocoon shell was studied.

Results. Based on the results of the research work carried out , In the databases of the PDIB It was found that the yield of raw silk from dry cocoons stored for 10-11 months decreased by 6.5%, the spinnability by 7.1%, and at the same time, the yield of the fluffy cocoon los produced during the spinning process increased by 1.6%, and the yield of the cocoon by 1.3% .

Conclusion. Factors that cause contamination and damage to cocoons and husks, as well as changes in the physical, chemical, and physical- mechanical properties of silk fibers in the cocoon husk during the technological processes of storing dry cocoons and cocoon husks were analyzed and identified.

Keywords: Cocoon, raw silk, linear density, adhesion, sericin, spinning speed, continuous spinning, spinning cycle, raw silk.

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Introduction

As our President emphasized, it is necessary to export not cheap raw materials, but high-quality products to foreign markets. In order to expand export opportunities and enter world markets, it is necessary, first of all, to develop joint ventures that produce finished products based on the processing of valuable raw materials. It is necessary to build modern compact enterprises together with foreign partners and bring them closer to the countryside, which is a source of labor resources [1].

Our republic occupies a leading position in the region in the production of raw materials important for the textile industry - cotton, natural silk, hemp, wool, etc., plays an important role in the economy and plays a major role in satisfying the needs of the population. In addition, the products produced are used for technical purposes in other sectors of the industry. In an era of developing a market economy and the global financial crisis, it is very important to effectively use local raw materials, expand the range of consumer goods, improve their quality, as well as increase the export potential of textile enterprises, and produce products that replace imported goods [2].

In particular, the sericulture industry is one of the largest production sectors of the Republic of Uzbekistan, occupying one of the leading positions in the world in the production and processing of cocoons. It follows that the products of this industry constitute a major source of export for independent Uzbekistan.

In order to further deepen economic reforms in the sericulture sector, create favorable conditions for the modernization of enterprises in the republic's sericulture industry and the establishment of new production facilities, increase the volume and expand the range of finished products competitive in the world market, the Decree of the President of the Republic of Uzbekistan No. PF-2167 of 2019 "On measures to strengthen the food base of sericulture, increase the volume of production of sericulture products, improve its quality, and increase the export potential of industrial enterprises" [3] was published.

In this purpose-oriented program of the government, the task of establishing silk production enterprises based on modern techniques and advanced technologies and exporting at least 70% of the produced products is defined in the territories of our republic.

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Main part

The demand for silk fiber, a valuable textile raw material, in the world market is increasing sharply from year to year. In the world, special attention is paid to the cultivation of high-quality cocoon raw materials, the effective use of the cultivated cocoon raw materials, improving the quality of raw silk, expanding the range of silk products and reducing their cost. The main silk-producing countries in the world are: China, India, Uzbekistan, Brazil, Japan, Korea, Thailand, Vietnam, Iran, etc. Several other countries are also engaged in the production of cocoons and silk raw materials in small quantities: Kenya, Botswana, Nigeria, Zambia, Zimbabwe, Bangladesh, Colombia, Egypt, Japan, Nepal, Bulgaria, Turkey, Uganda, Malaysia, Romania, Bolivia, etc.

The main consumers of silk in the world are: USA, Italy, Japan, India, France, China, Great Britain, Switzerland, Germany, UAE, Korea, Vietnam and other countries .

Although silk fiber has a small share (less than 0.2%) in the world textile market, it is produced in 60 countries around the world. The main producers are in Asia, but recently silk production has also been established in Brazil, Bulgaria, Egypt and Madagascar. Silk production is labor-intensive. In China, about 1 million people work in the silk industry. The silk industry employs 7.9 million people in India and 20,000 families in Thailand. China is the world's only major silk producer and a leader in supplying silk to world markets. India is the world's second largest silk producer. Silk production helps to provide employment for the rural population, prevent migration to large cities and provide the population with paid employment[4].

The five largest producers of live cocoons in the world are China (500,000 tons/year), India (126,000 tons/year), Uzbekistan (20,200 tons/year), Brazil (14,000 tons/year), and Vietnam (13,000 tons/year).[5] In this regard, it is important to further improve the consumer properties of silk fiber by further increasing the competitiveness of products made from raw silk in the world market .[6]

Improving the efficiency of raw silk production, cocooning and cocooning industries is largely dependent on the processes of preserving the naturalness of the properties of the cocoon and the technological properties of the cocoon shell. Although this may seem simple, it is important for technological processes. Because during the technological processes of cocoon cultivation and DIB, storage,

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cocoon and cocoon shell are affected by dust contained in the air, causing pollution of the cocoon shell and changes in its physico-chemical properties and characteristics. The research shows that -when the cocoons stored in the warehouse for 5-6 months are spun, the metrological conditions in the cocooning workshop worsened, the amount of dust in the workshop exceeded the permissible norm, the volatility of the cocoon shell decreased to 2-4%, the quality indicators of the raw silk produced deteriorated, the technological processes of steaming the cocoon, finding the thread of the cocoon and spinning It was found that the color and viscosity of the spun raw silk became more difficult due to the turbidity of the water used in these processes [7].

The main reason for the formation of dust and other impurities in the cocoon shell is the lack of improvement of cocoon cultivation and DIB technological processes in the cocooning and cocooning industries. Because the process of silkworm feeding has not yet been industrialized, 80-90 -% of the work in the process of silkworm feeding is done manually, when the cocoon is completely killed in the PDIB process, the cocoon shell is semi-dried, and it is formed in the process of drying in the open air for 2 months, spread on the floors of shaded dryers., is on average 70-78%, depending on the silkworm hybrid and feeding season . -Airborne fine and medium-sized dust particles settle in the pores of the cocoon shell during the process of silkworm cocooning, preparation of reared cocoon, temporary storage of wet cocoon, PDIB and dry cocoon storage.

100 ^{0}C - 120 ^{0}C and drying the cocoon shell to normal humidity in shaded dryers, the physicochemical -properties of the silk fibers in the shell also change dramatically. This is because the sericin substance in the silk fiber melts and softens at temperatures above 70 ^{0}C, causing conformational changes in macromolecules. When the cocoons that have been subjected to preliminary processing and killed the fungus are dried to normal humidity in shaded dryers, small and medium-sized dust particles in the air enter the pores of the cocoon shell, settle on top of the remaining dust particles, and gradually solidify together with sericin inside the pores, which significantly worsens the air and water permeability properties of the cocoon shell.

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Methods

Silk fiber since ancient times- as silver thread respectfully bride That's why for first first grind the cocoons and cocoons and other efforts are made to keep from dust. But hot and In dusty areas , during technological processes of cocoon cultivation, preparation, PDIB, wet and dry cocoon storage, airborne dust on cocoon and cocoon shell and the effect of other small dirty particles still remains. Because farm-raised cocoons are transferred to TPs and transferred to the received wet PDIB bases and spread on rice paddies in the open for 1-3 days until PDIB. Preliminary studies on the amount of dust and other small particles retained in the cocoon revealed that dust and other particles in the cocoon were 0.1% or more by weight of the cocoon. Cocoon dust is composed of complex fractional substances, consisting of fine silk fibers, mulberry leaves, and crushed parts of dried branches of plants used as stalks. 60-65% of dust is composed of particles up to 0.05 mm and the remaining 35-40% of particles with a size of 0.01-0.04 mm. In addition, the dust content consists of 40-42% mineral and 58-60% organic substances, and its composition also contains 1.7% silicon dioxide, which is dangerous for human health [8].

The following results were achieved in research conducted to analyze the effect of cocoon storage processes on the technological properties of cocoons and shells (presented in Tables 1 , 2, and 3).

Table 1 Shelf life and characteristics of cocoons and cocoons the effect of conditions

No.	Cocoon	The production of raw silk, %	Cocoon shell , %	The length of continuous immersion, m	Waste output, %
1.	The cocoons that have been washed after the initial treatment	39.7	89.7	756	8.3
2	Cocoons stored in a polyethylene bag for 2 months	37.6	79.1	652	9.9
3.	Cocoons stored in a bag for 2 months	34.5	75.5	473	11.8

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1 -shows that the yield of raw silk from the cocoon decreased from 2.1% to 5.2%, the cocoon shell volatility decreased from 10.6% to 14.2%, the length of continuous cocoon spinning decreased from 104 m to 283 m, and the amount of waste output decreased from 1.6% to 3.5%. increased to. The analysis of technological parameters of storage of cocoons grown in subtropical and dry microclimate conditions presented in Table 2.

Table 2 Effects of storage in wet and dry climates on cocoon and cocoon shell properties

No.	Indicators	Unit of measurement	Dry cocoon storage			
			In a subtropical climate		In dry climates	
			Polyethylene linen bag	The sand is in the bag.	In a polyethylene bag	The sand is in the bag.
1.	Moisture content of cocoons during bagging	%	10.71	10.71	13.83	13.83
2.	After 5 months	%	10.71	3.61	13.83	10.28
3.	Cocoon dust	%	0	5.26	0	9.72
4.	Raw silk production	%	35	33.28	33.17	31.6

2 -shows that, as for the time and conditions of cocoon storage, when dry cocoons were stored in polyethylene bags under subtropical and dry microclimate conditions for 5 months, their moisture content did not change. When stored in sandbags for 5 months, the moisture content decreased by 7.1% under subtropical microclimate conditions and by 3.55% under dry microclimate conditions. This showed that the seasonal change in metrological conditions had a high impact on cocoons stored in sandbags. The level of dust contamination of the cocoon shell remained unchanged in polyethylene film, while the level of contamination of cocoons stored in sandbags increased by 5.76% under subtropical microclimate conditions and by 9.72% under dry microclimate conditions. Accordingly, the amount of raw silk was also higher in subtropical microclimate conditions than in dry microclimate conditions.

In our recent research, we have studied the factors affecting the properties and characteristics of cocoon shells during the storage of dry cocoons in cans and polyethylene bags under production conditions. According to the results of the study, it was found that cocoons stored in polyethylene bags have better performance than cocoons stored in cans (Table 3).

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Table 3 Effects of storage of dry cocoons in a corner and a polythene bag under production conditions

No.	Indicators	Unit of measurement	Cocoons that have been stored for a year	
			The sand is in the bag.	In a polyethylene bag
1.	Initial weight of the cocoon batch	kg	1200	1170
2.	Amount of moth-damaged cocoons	5	0.1	-
3.	Cocoons with soiled cocoons	%	9.72	-
4.	Raw silk production	%	28.04	29.62

3 -show that during the storage of cocoons in bags in the warehouses of the cocoon-making enterprise, the properties of the cocoon and the technological characteristics of the cocoon shell are affected by the environment, metrological conditions, various insects, and various other factors, which lead to damage to the cocoon shell and changes in its physical and chemical properties. As a result, the water used in the cocoon spinning process becomes turbid and the quality of the raw silk obtained from it (color and fiber content) decreases [9]. This, in turn, complicates the technological processes of spinning dry cocoons, leading to a sharp decrease in the quantity and quality indicators of raw silk production.

To preserve the natural state of cocoons and cocoon shells, the air temperature in the cocoon storage warehouses of the cocoon processing plants and cocoon enterprises should not exceed 15-20 -0 ^{C}, and the relative humidity -should not exceed 60-70%. Due to the lack of opportunities to create such uniform moderate microclimate conditions throughout the year in the cocoon storage warehouses of the existing cocoon enterprises in our republic, the air temperature and relative humidity in the warehouse have a negative effect on the cocoon raw materials stored in these warehouses. As a result, the structural structure of the rings and packages formed by silk fibers in the cocoon shell is disrupted, the thread layers in the shell are damaged, and sericin softens and deteriorates. From dry cocoons stored for 10-11 months, the raw silk yield decreased by 6.5%, the spinnability by 7.1%, and the yield of the fluffy cocoon los produced during the spinning process increased by 1.6% and the cocoon yield by 1.3% [10]

This change in the seasons requires that the air temperature and relative humidity change accordingly. Such -seasonal changes in the air, as a result of which

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the relative humidity of the air decreases or increases, affect the technological properties of the cocoons and cocoon shells stored in warehouses. Since the cocoon shell is soft and porous, it easily passes moist air through it in the autumn, winter and spring seasons.

The ability of the cocoon to absorb moist air not only explains the increased moisture content of the cocoon shell, but also leads to a deterioration in the mechanical properties (softness, wrinkle resistance and flexibility) of the raw silk that is washed from the cocoon. High humidity also increases the fragility of the silk fiber. This is due to the fact that water penetrates between the fibrils and, as if lubricated, reduces the adhesion between the fibers, increasing fragility. The absorption of water into the silk fiber occurs mainly due to additional bonds, that is, “Van -Der -Waals” forces (hydrogen bonds, polarization of molecules and atoms, dispersion bonds). Molecules on the surface of the cocoon shell, which are adjacent to the air, change their properties under the influence of the external environment. Under the influence of dry air (when there is almost no water vapor in the air), the hydrophilic groups (OH, COOH) in the molecules on the surface of the silk fiber change their state to the inside of the upper molecule, and the hydrophobic (CH_3 - CH_2OH_2 -, and other hydrocarbon radicals) groups change their state to the outside, that is, to the surface bordering the air. Under the influence of high humidity air or an aqueous solution, the opposite of this phenomenon occurs, that is, the hydrophilic groups move to the surface. The hydrophobic groups move to the inside. (-See Figure 1).

Such a change in higher molecules is called a conformational change. Due to the storage of the cocoon in places with a high level of humidity, the silk fibers in the cocoon shell begin to thicken, as a result, the curliness of the fiber is lost. This causes a decrease in the forces of attraction between the molecules of the fiber, that is, the breaking of the bonds due to additional strength. In general, the fiber is shit

1 -picture. Conformational change of molecules on the surface.

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where R – CH_3, C_2H_5 – hydrocarbon radicals.

-ON – hydroxyl group.

a – the state of being in water or highly humid air.

b – condition in dry air.

level depends, firstly, on the nature of the fiber, and secondly, on the amount of moisture and oxygen in the air, as well as other factors.

The following conclusions were made based on the research results.

1. A method for determining the amount of weight force affecting the cocoons and shell in the technological processes of preparation, storage and DIB of wet and dry cocoons, external mechanical forces, and the amount of weight exerted by 30 kg of cocoons in the warehouses of the cocooning enterprise.

Factors causing pollution, damage of cocoons and husks, changes in physical chemical and physical mechanical properties -of silk fibers in cocoons husks were analyzed and determined in technological processes of PDIB and dry cocoons storage .-

3. The causes of wear and deformation of cocoons and shells during storage of dry cocoons were studied and the negative effects of these factors were theoretically justified.

References

1. Silk Road Chamber of international committee Zhangjiajie , China From the Secretariat of the I S AC. cooperation@srcic.com , December 17 , 2018

2. Resolution No. PP-4411 “On measures to organize the activities of the Uzbek Textile Industry Association” and “On additional measures to develop deep processing in the silk industry” dated July 31, 2019

3. Decree of the President of the Republic of Uzbekistan No. PF-4947 dated February 7, 2017 “On the Strategy of Actions on Five Priority Areas of Development of the Republic of Uzbekistan in 2017-2021”.

4. "On measures to organize the activities of the "Uzbekipaksanoat" Association": Resolution of the President of the Republic of Uzbekistan No. PP-2856 dated March 29, 2017.

5. Boboxonov F.O., Islambekova N.M. (2004). New surfactants to study the possibilities of protecting cocoons from pests. //J. Textile problems. - #2. -S. 8-9.,

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 04, April, 2025
brightmindpublishing.com
ISSN (E): 3061-6972

6. Sulaymonov Sh.A. (2021). The role of chemicals in the production processes of products at enterprises of the textile industry. Uzbekistan republic innovative development ministry scientific magazine . No. 4, page 83-91 .
7.R Alisher, S Sharifjon, R Akmal Study of the Influence of Silkworm Feeding Conditions on the Quality of Cocoons and Properties of the Cocoon Shell. J. Engineering, Scientific Research Publishing #11 2019 . 755-758
8 . Sharifjon Sulaymanov Abdumannabovich, Parpiyev Sayfiddin, Umida Nizamova Sandjarovna, E ffects of surface active substances in protection of dry cocoon from dust and other factors. Proceedings of Global Technovation 2 nd International Multidisciplinary Scientific Conference Hosted from London, UK https://conferencepublication.com December 28th, 2020 #1 94-99 p .
9. Sh. Sulaymanov, A. Sativaldiyev (2021). Theoretical Fundamentals of Cocoon Ball Moisten and its Modification with Surface Active Substances. *Design Engineering* , 10636 – 10647
10. Islambekva N.M., Umurzakova Kh.Kh. Studying the effect of the surfactant synthesized on the basis of industrial waste on the physical and chemical properties of cocoons . -//J. Textile problems -2007. - #3. - S. 70-72.