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Increasing The Yield Of Raw Silk Based On The Study Of Reducing The Anisotropy Of The Cocoon Shell

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ABSTRACT

In the research work, it was proved that the silk yield depends on the hybrid, weight, hardness, size and thickness of the cocoon shell of the silkworm.

At the same time, it has been studied that the initial processing modes of the cocoon, storage, sorting, evaporation of the cocoons and spinning of the cocoons have a great impact on the output of raw silk. The thickest part of the cocoons is the waist, which varies from 0,14 mm to 0,45 mm. These figures also indicate the anisotropy of the cocoon shell. In order to reduce the anisotropy of the cocoons, we found a noionogenic SAM to obtain the solution and process the cocoons. We prepared different concentrations from the obtained SAM and studied their absorption into the cocoon shell. As a result, in the study, it was found that the cocoons were treated with a 0,1% SAM solution to determine the wetting and permeability properties, which improved the yield of raw silk. As a result of cocoon processing, the output of raw silk increased by 4.36% compared to control, the output of silk increased by 3,37%, and the output of cocoon skin decreased by 2,27%. The specific consumption of cocoons was 2,76 kg.

KEYWORDS

Cocoon, raw silk, boiler,, anisotropic, surfactant, cocoon shell, cocoon waist part, head hemisphere part, tag hemisphere part

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INTRODUCTION

The economic value of a cocoon is characterized not by its silkiness, but by the quantity of raw silk, i.e., the output of silk relative to the weight of the cocoon. Silk yield depends on the silkworm hybrid, weight, hardness, size, and cocoon shell thickness. However, the initial processing modes of the cocoon, storage, sorting, steaming and spinning have a huge impact on the output of raw silk. If the methods and regimes of anesthesia of the sponge are chosen incorrectly, if the cocoons are improperly prepared for rinsing, the yield of raw silk will be significantly reduced [1].

Cocoon hybrids come in a variety of shapes, including spherical, oval, cylindrical, and cylindrical belts, with spherical and oval shapes that are easy to sew between them. The cylindrical waist also washes well. In deep-seated cocoons, the thickening of the lumbar region worsens the swelling. Because anisotropy occurs in the shell.

Main part. When the cocoon shell was examined in pieces, it was found that the thickness varied. The apex of the hemispheres of the shell is the thinnest part, and the hemisphere itself is of moderate thickness. The thickest part is the waist, which varies from 0.14 mm to 0.45 mm. These figures also indicate the anisotropy of the cocoon shell [2].

It is known that due to non-compliance with the agronomic techniques of feeding, worsening weather conditions, along with varietal cocoons appear defective cocoons. These include double-spotted, deformed, perforated, thin-shelled, satin, and spotted cocoons, the most common of which are spotted cocoons. Such cocoons occur as a result of contamination with fluid from an infected worm or fungus. The pores in the shell are filled with this liquid, further increasing its anisotropy.

Such unevenness in the cocoon has an effect on the moisture and water permeability of the shell, leading to deterioration of the cocoon, a large amount of waste and a decrease in the efficiency of the machine. One way to improve the evaporation rate of the cocoon is to flatten the technological properties over the entire surface, in particular to ensure a maximum plane of moisture, water, air and vapor permeability of the shell [3].

Evaporation by hot water treatment to soften the sericin is the basis of the technological process in ensuring cocoon washing. During evaporation, sericin swells and partially dissolves. In general, evaporation occurs through the absorption of water into the shell and the passage of water through its walls. If the evaporation process is flat across the shell, this indicates that the evaporation process is going well.

The permeability property on the shell surface is determined by the occurrence of anisotropy, density, thickness, porosity and individual defective parts. Eventually, the unevenness of the passage of water through the cocoon shell reduces the yield of raw silk, reducing its permeability [4,5].

RESULTS AND DISCUSSIONS

The researchers studied the evaporation of the cocoon shell by relating it to the silkworm breed and hybrid, the initial operating conditions, the rooting preparation regimes, especially the water temperature, the pH environment, and the amount of salts in the solution. These factors play an important role in the evaporation of cocoons. However, the uneven wetting of different parts of the cocoon shell results in anisotropy of evaporation across the parts due to the uneven passage of water [6,7].

In order to improve the technology of evaporation and rinsing of cocoons, it is expedient to study the water permeability, moisture content of the shell.

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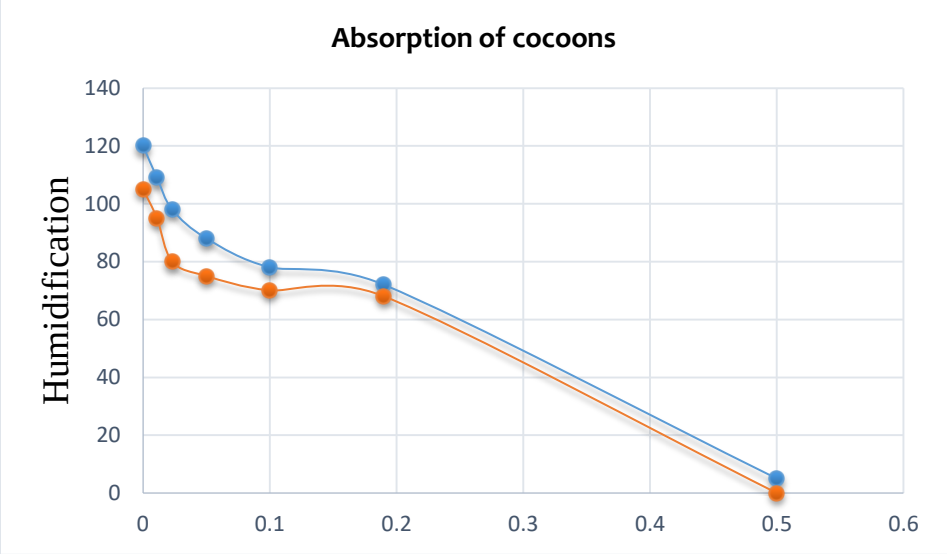
Today, in various technological processes, modern methods of moisture control are based on the use of these compatible surfactants (SAM) [8,9]. They are adsorbed on the phases between the surfaces, reducing the surface tension.

Two different methods are used to adjust the humidity

- It is used to form a solution from SAM
- Determine whether the object is treated with a solution formed from SAM and then moistened with a standard liquid.

So based on this, we found a nonionic SAM for solution extraction and cocoon processing. We prepared different concentrations from the obtained SAM and studied their absorption into the cocoon shell.

We determined the absorption of varietal and defective cocoons for research.



1-defective cocoons; 2- quality cocoons

Fig. 1. Dependence of cocoon moisture on solution concentration.

Moisture content was 1200 in spotted cocoons and 1050 in varietal cocoons. When solutions of SFM were exposed to cocoons, the wetting of the cocoon shell increased with increasing concentration. Even the wetting of both cocoon samples was equal in the range of 0,2–0,5% of the solution. It was found that this can be achieved by using SAM to adjust the humidity of the cocoons [10].

At the same time a reduction in the anisotropy of the spotted and defective parts of the cocoons was achieved.

In our research work, we found that different solutions of SAM were prepared and processed into sample cocoons, which were then dried and moistened with water.

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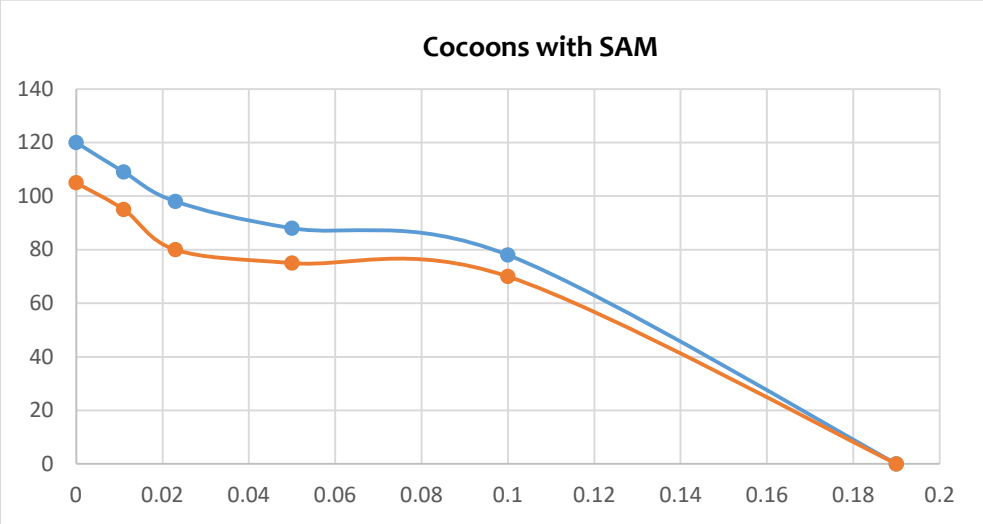

1-defective cocoons; 2- quality cocoons

Figure 2. Dependence of cocoon moaning on processing concentration.

The results obtained showed that when the cocoons were treated with the solution and then their moisture was checked, the anisotropy of the cocoon in the stained and spotless parts decreased, and when treated with a 0,1-0,2 % solution, both samples had the same moisture content.

During the evaporation of the cocoons, water passes through the shell, but the permeability varies in different parts. This is due to the density, thickness and presence of defects in the cocoon shell.

In our research, we examined the passage of water through the cocoon parts.

1- Table

Water passage through the cocoon shell

Pieces of cocoon shell	Water permeability, $ml/sm^2.s$	Shell defect	Water permeability, $ml/sm^2.s$
The apex of the main hemisphere	0,017	clean part	0,010
The main hemisphere	0,009	defective part	0,003
Waist section	0,004	clean part	0,012
Tag hemisphere	0,008		
Таг ярим шар чўққи қисм	0,018	defective part	0,04

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Determination of water permeability of cocoon shell was carried out at a pressure of 1,962 kPa and a temperature of 25 0C. The results showed that the water passed poorly through the waist of the shell and well through the apex. It was found that the water penetrated worse than the stained part compared to the clean part of the shell.

It is advisable to use solutions of SAM to eliminate such differences. The same method was used to improve the water permeability, given that a good performance during the detection of cocoon moisture was obtained when the shell was treated with SAM solution. Noionogen SAM and 0,1 % solution of noionogenic SAM was prepared and processed into cocoon shells. This substance reduces the surface tension of the water and increases the moisture content of the fibers.

2-Table

Water permeability of the processed cocoon shell

Pieces of cocoon shell	Pre-processing water permeability, ml/sm^2.s	Post-treatment permeability with SAM, *ml/sm^2.s*
The apex of the main hemisphere	0,840	1,120
The main hemisphere	0,800	1,118
Waist section	0,760	1,117
lower hemisphere	0,803	1,119
The apex of the lower hemisphere	0,839	0,18

The research was carried out in water at a temperature of 25 0C at a pressure of 7,34 kRa. The results showed that the water permeability varied across the cocoon parts, and that the water permeability increased after treatment with SAM, while the anisotropy on the parts decreased. A similar study was conducted on stained cocoons.

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3-Table

Water leakage from treated stained cocoons

(t = 25 oC, pressure 7,34 kPa)

Pilla pieces	Water permeability, $ml/sm^2.s$
Unprocessed varietal part	0,450
Unprocessed clean part	0,840
Stained part treated with 0,1 % solution of SAM	1,101
Pure part treated with SAM 0,1 % solution	1,110

The results showed that the anisotropy in water permeability decreased as a result of processing compared to the parts of untreated cocoons. This will ensure a smooth surface of the cocoons, reduce the number of rings, increase the yield of raw silk.

Based on the results obtained in the study to determine the properties of moisture and water permeability, we determined the amount of raw silk yield by treating the cocoons with a 0.1% SAM solution.

4-Table

Washing of processed cocoons

Indicator	Output, %			The specific cost of the cocoon
	Raw silk	Los	Treasurer	
Untreated cocoons	30,84	10,07	9,47	3,24
Processed cocoons	35,2	6,7	7,2	2,76

CONCLUSION

The results showed that as a result of processing, the yield of raw silk increased by 4,36 % compared to control, the yield of molasses decreased by 3,37 %, and the yield of goat skin decreased by 2,27 %. The specific consumption of cocoons was 2,76 kg.

Based on the study of the effect of the concentration of the substance on the level of moisture content by selecting the method of treatment with noionogenic SAM in reducing the anisotropy of the cocoon shell, it was determined that the optimal option is a 0,1 % solution.

Because of treatment of the cocoon with this solution, a uniform level of water permeability was achieved in the parts and defects of the cocoon, and the yield of raw silk increased by 4,36 % compared to the control.

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