STUDY OF WATER ABSORPTION OF TWIN COCOONS

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Abstract. *This article examines changes in the absorbency of twin cocoons of different shapes at different water temperatures. At a temperature of 40°C, the absorption and weight change of the cocoons are very insignificant with increasing duration, whereas at a water temperature of 98°C, the weight of the cocoons increases significantly more rapidly.*

Keywords: *twin cocoons, oval cocoons, spherical cocoons, malformed cocoons, cocoon absorbency.*

Introduction. Before unwinding twin cocoons, careful sorting is required. Twins are usually divided into three grades: Grade I, which consists of the largest twins of uniform shape and size; 2nd grade twins are less dense, with spots, but can be unwound; 3rd grade twins are monstrosities, cocoons spun by more than two caterpillars, varying in shape and size. These cocoons cannot be unwound and are sent to silk mills. Unwinding 1st grade twins produces yarn of a specific titer, while 2nd grade twins produce yarn with a high linear density.

To soften the sericin, the twins are usually pre-steamed in water for 7-8 minutes with the addition of a small amount of alkali or special surfactants. The ends are found using a small broom, onto which the thread ends are wound. Cocoons from which denier yarn is obtained are not steamed; from the soaking station, they are sent directly to the unwinding machine and unwound in very hot water.

When these cocoons are unwound, a range of raw silk of 6.45 tex is produced; raw silk of this range is used as the basis for the fabric "khan-atlas" and "bekasam" and for the production of "chesucha".

Several studies have shown that studying the physicochemical and technological properties of twin cocoons can help develop technologies for producing high-texture raw silk and using this raw silk in the production of bekasam and tussah fabrics. The aim of this study is to investigate the physicochemical properties of twin cocoons, classify them by group, and identify the potential for unwinding individual groups to produce raw silk.

Data and discussion. To achieve this goal, we selected twin cocoons from the Ipakchi-1xIpakchi-2 hybrid harvested in 2025. The study was conducted by the research laboratory of the «Silk Technology» Department using established methodology.

Water absorption by cocoons is a highly complex phenomenon. Cocoon saturation with water can occur either due to the permeability of the shell, leading to water penetration into

the cocoon, or due to saturation of the shell itself, with the shell's permeability changing significantly. The amount of water passing through the cocoon shell per unit of time depends not only on the factors that control air passage, but also, to a greater extent, on the swelling of sericin and fibroin when the cocoon is wetted with water, the degree of filling of the cocoon with water, the difference between atmospheric and internal cocoon pressures, and the degree of shell damage during cocoon treatment with water. Hot water treatment is one of the key operations in the production process; under the influence of water, the cocoon shell is crushed and deformed, and its permeability changes. When exposed to water, the shell thickness primarily increases due to swelling of sericin and, to some extent, fibroin. This thickening occurs primarily inward, while the external dimensions of the cocoon change relatively little. The thickness of the cocoon shell in a wet state, with sufficient sericin softening, increases by 30-50%.

Deformed cocoons, resulting from exposure to water at alternating temperatures or water, typically have reduced permeability. For testing, we use twin cocoons of various shapes: spherical, oval, and malformed. Before testing, the cocoons are cleaned of cotton wool and numbered with a black pencil. Generally, it is recommended to unwind twin cocoons in hotter water than normal cocoons.

The results of changes in the absorbency of twin cocoons of various shapes at different water temperatures are shown in the table.

The table shows that the absorbency of the cocoons increases with increasing duration and temperature. At a temperature of 40°C, the absorbency and change in cocoon weight are very insignificant with increasing duration, while at a water temperature of 98°C, the cocoon weight increases significantly.

Table

Changes in the absorbency of twin cocoons of different shapes at different temperatures

№	Processing time, min.	Cocoon shape	Absorption, %	Cocoon shape	Absorption, %	Cocoon shape	Absorption, %
Water temperature is 40^0C							
1	1	Oval	38.88	Spherical	51.61	Ugly	50
2	3		44.68		45.45		47.14
3	5		48.07		61.90		56.71
4	7		49.23		82.90		114.25
5	9		90		77.77		111.66
6	12		102.08		114.89		107.27
Water temperature is 60^0C							
1	1	Oval	25.58	Spherical	45.45	Ugly	47.72
2	3		54.38		63.4		59.61

3	5		63.64		64.15		67.18
4	7		63.79		82.6		109.09
5	9		118		113.64		119.35
6	12		130.76		157.97		142.22
Water temperature is 80^0C							
1	1	Oval	55.66	Spherical	66.0	Ugly	73.46
2	3		122.95		72.41		116.36
3	5		137.94		117.39		130.76
4	7		145.0		137.5		148.08
5	9		161.9		150.0		173.13
6	12		228.3		182.0		244.82
Water temperature is 98^0C							
1	1	Oval	121.28	Spherical	164	Ugly	218.03
2	3		162.06		246.67		245.95
3	5		168.18		285.7		384.43
4	7		264.0		348.8		294.2
5	9		379.55		316.67		368.09
6	12		417.73		351.02		383.3

Conclusion: From this it is clear that for proper steaming of twin cocoons, it is necessary to carry out the process at higher temperatures and for a longer period.

LITERATURE

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