

STUDY OF GEOMETRICAL PROPERTIES OF TWIN COCOONS

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Abstract. This article examines the geometric properties of twin cocoons. The length, diameter, degree of narrowness, and degree of constriction by shape are studied. The maximum length of twin cocoons is 35 mm with an oval shape, while the minimum length is 21.29 mm with a malformed shape. The degree of narrowness in twin cocoons is the lowest for spherical cocoons (1.30). The highest value is for oval cocoons (1.65). The degree of constriction for twin cocoons of different shapes does not exceed one.

Keywords Twin cocoons, oval cocoons, spherical cocoons, malformed cocoons, apex of the cerebral hemisphere, cerebral hemisphere swelling, interception.

Introduction. The silk industry meets the needs of the population and a number of sectors of the national economy for silk products. Its enterprises produce a wide variety of fabrics: the finest silks and heavy suit furs, decorative upholstery fabrics for radios, car and airplane interiors, parachute fabrics, surgical and insulating silks.

The future development of the silk industry envisions a significant increase in production with a sharp increase in labor productivity, renewal and expansion of the product range, improvements in quality, and the economical use of raw materials. Further technical re-equipment of the enterprise is planned by replacing obsolete equipment with new high-performance machines, as well as comprehensive mechanization and other labor-intensive work, and the use of computers for process control.

In cocoon reeling, growth in natural silk production will be achieved through both improved cocoon reeling technology and improved utilization of cocoon raw materials. Increased production capacity is achieved through the construction of new and renovation of existing facilities, particularly with the increase in cocoon harvesting in the Republic. The high cost of natural silk requires finding ways to reduce its cost. This can only be achieved through a significant improvement in cocoon quality.

Cocoons are classified as normal and defective. A normal cocoon is one containing a formed pupa within, with the shape and color characteristic of a given breed or hybrid combination, and a clean, hard, and intact shell without any defects. Defective cocoons are those that differ in the structure, shape, purity, integrity, and structure of the shells characteristic of cocoons of a given breed or hybrid. Defective cocoons include double cocoons, which are cocoons spun by two or more caterpillars. They are spherical or

oval in shape, but can also be malformed if the cocoons are spun by three or more caterpillars.

Double cocoons have a larger volume, a thick, rigid shell, and an unevenly thick and knobby thread. This is explained by the caterpillars laying the thread in different parts of the shell, independently of each other. As a result, the threads become entangled, and when unwound, they come off the shell unevenly and often break.

The main causes of double cocoons are crowding of caterpillars on the cocoon beds, the very simultaneous maturation of the caterpillars, and the simultaneous ascent of the cocoons. Double cocoons are most often spun on natural cocoon beds, less often on cellular ones. The formation of double cocoons is not a hereditary trait. However, under favorable conditions (crowding and close curling), some silkworm species tend to spin such cocoons. Double cocoons are spun by caterpillars regardless of gender. Approximately one-quarter are spun by either males or females, and only one-half are spun by both males and females.

Results and discussion. The primary measures for reducing the production of twin cocoons are the timely and abundant installation of cocoon boxes, primarily artificial honeycomb ones. Currently, twin cocoons account for approximately 2% of the annual dry cocoon harvest in the republic. Twin cocoons are sent to silk spinning mills to produce silk yarn. Due to the large quantities of waste from the sorting shop, and the significant difficulties in using it in spinning, the question of how to efficiently utilize this waste in cocoon winding mills is of great importance.

The geometric properties of cocoons are characterized by length, cross-sectional diameter, shape, volume, and shell surface area. All these cocoon properties depend on the silkworm breed, economic and zootechnical conditions during caterpillar rearing, spinning conditions, and the type and size of the cocoon boxes. The linear dimensions of cocoons are characterized by length and width. The width of the cocoon varies in different areas and depends on its shape. Cocoons can be spherical, oval, smooth, with a weak or deep constriction, elongated, cylindrical, or pointed with one or two pointed ends. Cocoon shape is expressed by the degree of narrowness and the degree of constriction. The degree of narrowness (C_u) is the ratio of the length to the average diameter of the cocoon hemispheres, and the degree of constriction (C_p) is the ratio of the average diameter of the hemispheres to the diameter of the constriction.

This research study examined the length, diameter, degree of narrowness, and degree of constriction of oval, spherical, and malformed cocoons.

Table .

Geometric characteristics of twin cocoons

№	Cocoon shape	Length of cocoons, mm	Intercept diameter, mm	Hemisphere diameter, mm		C _u	C _p
				head part	abdominal part		
Maximum	Oval	41.0	23.4	23.5	22.6	1,65	1,30
Minimum		32.0	18.5	18.6	18,5		
Average		35.0	21.5	21.3	20,9		
Maximum	Spherical	41.0	23.5	23.5	22,6	1,56	0,97
Minimum		32.0	18.6	18.6	18,5		
Average		35.0	21.3	21.3	20,9		
Maximum	Ugly	36.2	26.9	24.8	22,5	0,93	0,87
Minimum		29.0	19.8	20.3	15,9		
Average		32.9	23.1	22.3	20,2		

The table shows that the average length of oval-shaped twin cocoons was 35 mm, spherical-shaped twin cocoons 28.7 mm, and malformed twin cocoons 21.29 mm. After measuring the geometric parameters of the twin cocoons, the degree of narrowness and constriction were determined. Spherical cocoons had the lowest degree of narrowness for twin cocoons, at 1.30. Oval cocoons had the highest degree of narrowness, at 1.65. However, the degree of constriction for twin cocoons of different shapes did not exceed one.

Conclusion: The maximum length of oval-shaped twin cocoons is 35 mm, while the minimum length for malformed twin cocoons is 21.29 mm.

Spherical cocoons had the lowest degree of narrowness for twin cocoons, at 1.30. Oval cocoons had the highest degree of narrowness, at 1.65. Moreover, the degree of interception of cocoons-twins of different shapes does not exceed one.

Literature

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