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INFLUENCE OF COCOON SHAPE ON THE DYNAMIC FORCE OF THE COCOON THREAD COMING OUT OF THE SHELL

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Annotation. The article analyzes the shape of cocoons, which influences the technological process of their unwinding. In order to develop, depending on the tension of the cocoon thread on the shape of the cocoon for experimental studies used spherical and oval cocoons of medium caliber without interception and with interception of the varietal mixture of the hybrid Ipakchi-1 x Ipakchi-2. To determine the dynamic force of the cocoon thread coming off the shell, the cocoons of selected samples with a set degree of interception were unwound on a single unwinding machine equipped with a strain gauge system at a speed of 85 m/min. During unwinding, the thread tension was measured and the number of breaks was counted, and it was revealed that the shape of the cocoon affects the unwinding performance.

Key words: Cocoon shape, caliber, thread tension, single unwinding, breed, thread shedding forces.

According to their shape, cocoons are classified as spherical, oval, without an interception, with a weak and deep interception, cylindrical, pointed with one or two pointed ends. This not entirely accurate division of cocoons into groups gives only the most general idea of their shape. In the case of a geometric expression, the shape of the cocoon is characterized by the actual shape of the projection of the shell of the cocoon, cut lengthwise in the middle into two different parts. To obtain a projection of the cocoon, it is enough to attach any half of the shell with the cut side to the paper and trace its outline with a sharp pencil.

The shape of the cocoons greatly influences the technological process of their unwinding. According to scientists, the most convenient for unwinding are spherical and oval cocoons, with a shallow interception; cylindrical cocoons are not convenient, especially with pointed ends. During their steaming and unwinding, holes often form on the sharp ends, causing thread breakage and preventing further unwinding. Under normal conditions, the caterpillars of each breed of silkworm howl into cocoons of a certain shape unique to that breed. At the same time, it varies significantly even within one breed.

Cocoons obtained from rearing hybrids vary especially greatly in shape. In order to establish the dependence of the tension of the cocoon thread on the shape of the cocoon, for experimental studies we used spherical and oval cocoons of

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medium caliber without interception and with interception of a varietal mixture of the hybrid Ipakchi-1 x Ipakchi-2, harvest 2023.

It is known that the quantity that determines the shape of the cocoon can be characterized by the following expression:

$$\frac{D, d_p}{d_1, d_2}$$

Where: D -is the length of the cocoon, mm; d_p-diameter of interception, mm;

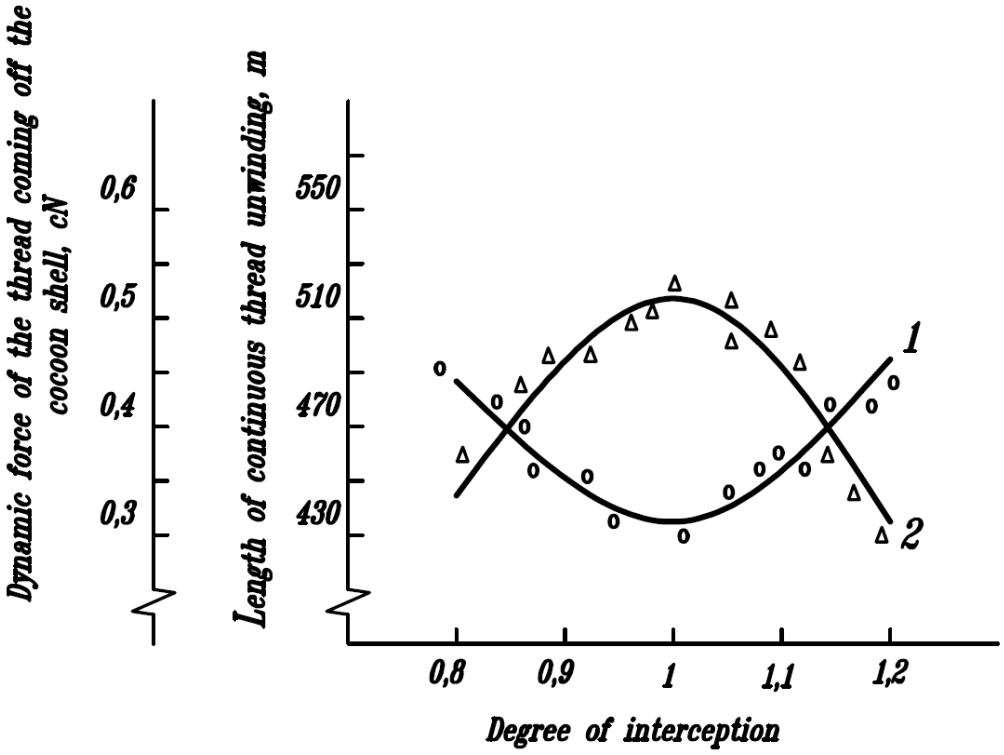
d_1 and d_2 – diameter of the hemispheres, mm.

As a numerical expression of the shape of the cocoons, the concept of "degree of interception" (C_p) was used - i.e. ratio of the average diameter of both hemispheres to the diameter of the interception

$$C_p \frac{d_1 + d_2}{2d_p}$$

For a spherical cocoon, C_p = 1; oval without interception – C_p<1, and with interception – C_p>1.

To determine the dynamic force of the cocoon thread coming off the shell, the cocoons of selected samples with a set degree of interception were unwound on a single unwinding machine equipped with a strain gauge system at a speed of 85 m/min. The strain measuring system contains a power supply, an N-117 oscilloscope, a UT-4-1 amplifier, and a single cocoon thread tension sensor. During



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unwinding, the thread tension was measured and the number of breaks was counted (Figure).

Fig. The influence of the degree of interception on the dynamic force of the thread coming off the cocoon (1) and the length of the continuously unwinding cocoon thread (2).

The location of the experimental data characterizing the tension of the thread on the degree of interception indicates the absence of a parabolic relationship between them. The experimental data were approximated to the analytical function using the least squares method. As a result, we obtained an equation of the form

$$У_1=3.77X^2-7.45X+3.99$$

Where $У_1$ is the dynamic force of the thread coming off the sheath, cN; X-degree of interception.

The smallest (0.29 cN) force of the cocoon thread coming off is observed when unwinding cocoons with a degree of interception equal to 1.0, i.e. spherical cocoons. Increasing the force of the cocoon thread coming off

$$У_2=-1999.5X^2+3978.7X-1458$$

Where Y2 is the length of the continuously unwinding cocoon thread, m.

Thus, the shape of the cocoon affects the unwinding performance; Moreover, it is preferable to unwind spherical cocoons due to the reduction in tension and the number of breaks

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