VARIABILITY OF COCOON QUALITY TRAITS IN DIFFERENT BREEDS OF THE MULBERRY SILKWORM AND THEIR CORRELATIONS

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Abstract. This abstract analyzes the variability of the main cocoon quality traits in different breeds and hybrids of the mulberry silkworm (Bombyx mori), including cocoon weight, shell weight, shell ratio, cocoon shell silk content, fiber length, and the yield of silk fiber. It highlights the theoretical and practical aspects of using correlation analysis to determine the interrelationships among cocoon quality indicators. The results show that the relationships between cocoon weight and shell weight, shell ratio, and fiber length are important in the selection process. The identified correlations may serve as important criteria for selecting breeds and hybrids that produce high-yielding, high-quality cocoons.

Keywords: mulberry silkworm, breed, hybrid, cocoon, cocoon weight, shell weight, silk content, fiber length, variability, correlation, selection.

Increasing cocoon yield and its technological quality indicators in mulberry sericulture is one of the key factors ensuring the economic efficiency of the sericulture sector. Cocoon quality is shaped by the hereditary characteristics of the mulberry silkworm, the feed base, rearing conditions, temperature and humidity regimes, the duration of larval development, and other external factors.

Significant differences are observed among mulberry silkworm breeds in cocoon weight, shell weight, shell ratio, silk content, fiber length, and other technological indicators. Therefore, the comparative study of different breeds and hybrids, the determination of the degree of variability among them, and the assessment of correlations between economically and technologically important traits are among the

key directions of breeding work.

In particular, when selecting a form that is high in one trait, it is important to know how other traits change. For example, an increase in cocoon weight does not always lead to a proportional increase in shell ratio. For this reason, identifying correlations between traits provides valuable practical information for breeding.

The main aim of the study is to examine the variability of the main cocoon quality traits in different breeds and hybrids of the mulberry silkworm and to determine the correlations between these traits.

To achieve this aim, the following tasks were defined:

Determine cocoon weight in different mulberry silkworm breeds and hybrids.

Comparatively evaluate cocoon shell weight and shell ratio.

Determine the degree of variability in technological cocoon quality indicators.

Calculate correlations among the main quality traits.

Assess the possibilities of using correlation results to identify promising breeds and hybrids for selection.

The studies are conducted on different breeds and hybrids of the mulberry silkworm. It is advisable to rear the larvae of the experimental variants under identical feeding and rearing conditions. For each breed or hybrid, cocoon samples are collected and their main quality indicators are determined. Cocoon weight is determined in grams on an analytical balance. Shell weight is determined by separating the silk layer from the outer part of the cocoon.

Differences in cocoon quality indicators among different breeds and hybrids are primarily explained by their genetic characteristics. Cocoon weight is one of the important productivity traits of the mulberry silkworm, and the higher this indicator, the more the cocoon shell weight tends to increase as well.

However, a high cocoon weight does not always guarantee a high shell ratio,

since the pupa's mass also affects the total cocoon weight. From this perspective, it is important to evaluate shell weight and shell ratio separately alongside cocoon weight.

In different breeds, a positive correlation is usually observed between changes in cocoon weight and changes in shell weight. This is related to the fact that as cocoon weight increases, the mass of the silk layer in it also increases.

There is also a logical relationship between shell weight and shell ratio: the higher the share of shell weight relative to cocoon weight, the higher the shell ratio.

Another technological characteristic of cocoons is fiber length. Cocoons with long fiber are a valuable raw material for industrial processing. Therefore, when evaluating breeds, attention should be paid not only to cocoon weight but also to the technological properties of the fiber.

The use of correlation analysis in research makes it possible to evaluate the complex characteristics of breeds. In particular, a strong positive correlation between cocoon weight and shell weight may allow breeders to identify forms with high shell weight by selecting on the basis of cocoon weight.

If the correlation between cocoon weight and shell ratio is moderate or high, cocoon weight can be used in breeding as an indirect selection criterion. If this correlation is low, independent selection based on these two traits is required.

The relationship between shell weight and fiber length is also of practical importance. If a positive correlation exists between these traits, the chance of selecting long-fiber cocoons increases in breeds with high shell weight.

However, a high correlation coefficient does not indicate a cause-and-effect relationship between traits. It only expresses the tendency of the traits to change together. Therefore, the results of correlation analysis are advisable to interpret together with genetic parameters, environmental effects, and other statistical indicators.

When assessing the variability of traits in mulberry silkworm breeds, the coefficient of variation is an important statistical indicator. A trait with a low

coefficient of variation is relatively stable in the population, whereas a trait with a high coefficient of variation shows a greater degree of variability. By comparatively analyzing the coefficients of variation for cocoon weight, shell weight, shell ratio, and fiber length, it is possible to determine which traits are hereditarily more stable and more suitable for selection.

If high variability is observed in a trait, this creates a positive opportunity for selection, since a broad range of material is formed for choice. On the other hand, high variability may indicate a strong influence of the environment. Therefore, it is important to separate phenotypic variability from genotypic variability when evaluating it.

Determining correlations makes it possible to organize mulberry silkworm breeding in a targeted manner. If a high positive correlation exists between two economically important traits, improvement in the second trait can be achieved through selection based on the first. For example, if a high positive correlation is found between cocoon weight and shell weight, the chance of obtaining offspring with high shell weight increases by selecting families with high cocoon weight.

If a negative correlation is observed between two important traits, the breeding process becomes more complex. In such cases, complex selection methods are required to improve both traits simultaneously.

Furthermore, by comparing correlation coefficients across generations, it is possible to determine the stability of traits and the direction of change in the breeding process.

Significant variability exists in cocoon quality indicators among different breeds and hybrids of the mulberry silkworm, and these differences are determined by their genetic characteristics and rearing conditions. A comprehensive study of traits such as cocoon weight, shell weight, shell ratio, and fiber length allows the technological value of breeds to be assessed correctly.

Correlation analysis is an effective method for identifying the interdependence among cocoon quality indicators and for establishing indirect selection criteria in breeding. A positive relationship between cocoon weight and shell weight may be important for selecting high-yielding breeds. At the same time, technological traits such as shell ratio and fiber length should also be evaluated independently. In general, the combined use of variation and correlation analysis in evaluating mulberry silkworm breeds provides a scientific basis for selecting promising breeds and hybrids with high cocoon productivity and quality.

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