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# STUDY OF THE SCIENTIFIC BASIS OF IDENTIFICATION OF SELECTED INDUSTRIAL MULBERRY SILKWORM HYBRIDS

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**Abstract**
Analysis of productivity indicators of half-marked breeds of the world collection of silkworms of the Sericulture Research Institute, improvement of some valuable indicators of selected breeds, the problem of butterflies not emerging from cocoons in half-marked breeds, hybridization among half-marked breeds. selection, the processes of creating combinations, testing the created hybrids in laboratory and production conditions are presented.

**Keywords**: Mulberry silkworm, mulberry leaf, egg, embryo, larva, mushroom, bunch, anther, cocoon, butterfly, breed, hybrid, heterosis, female, male, marked by sex.

## Introduction

In the following years, several decisions were made on the development of cocooning and the preparation of high-quality silk raw materials. In particular, the President of the Republic of Uzbekistan dated March 29, 2017 on measures to organize the activities of the "Uzbekipaksanoat" association No. PQ-2856, dated March 20, 2018 "On further development of the cocoon industry on additional measures" No. PQ-3616, dated December 4, 2018 "On additional measures to support the rapid development of the cocoon industry in the Republic" No. PQ-4047 of January 17, 2020 "On the development of the silkworm feed base in the cocoon industry" "on additional measures" PQ-4567 and September 2, 2020 "Republic of Uzbekistan silk and wool "On the organization of the activities of the industry development committee" decisions No. PQ-4817, extensive testing of the achievements of silkworm selection, development of primary breeding of mulberry silkworm breeds and hybrids, taking into account the natural climatic conditions of the regions , creating breeds and hybrids that meet international standards through advanced scientific developments and the development of intensive agrotechnologies, increasing the production of local silkworms and cocoons, improving their quality, and sericulture urgent tasks for expanding the export opportunities of the industry have been defined.

In order to fulfill these tasks, it is necessary to carry out promising scientific research in our country on the development of new selection methods aimed at improving the technological properties of cocoon and cocoon production.

In the climatic conditions of Uzbekistan, only mulberry silkworm breeds that are genetically adapted to sudden changes in climate, dry, hot and dusty air, mulberry leaves with low humidity, and local microflora can develop well and produce high yields. Genetically modified breeds created in Uzbekistan meet such requirements.

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**Research Methods**

12 breeds of mulberry silkworm were selected from the breeds in the world collection of the Sericulture Research Institute, with W2W2, W3W3, W5W5 genes translocated to the sex W chromosome. According to the genetic modification of these breeds, depending on the color of the eggs, they are divided into male (light colored) and female (dark colored) sexes. These are breeds S-5, S-5pr.g., S-6, S-10, S-12, S-13, S-14, Belokokonnaya 1, Belokokonnaya 2, SANISH 8, SANISH 9. Information about sexed breeds in the egg stage was taken from the catalog.

Selection works with the breeds determined by sex at the egg stage were carried out according to the "Main Methodological Guide for Breeding Works with Mulberry Silkworm". Some changes have been made to it, taking into account the genetic characteristics of the sexed breeds. Families of breeds determined by sex at the egg stage were incubated separately by sex. At the egg stage, families were separated and sorted according to low reproductive performance, gender imbalance and low egg survival rate. For feeding in the second year of worms, 110 males and 110 females (dark, pale) from each family were counted and reared together, and worms were counted from 150 (in 3 replicates) hybrids intended for laboratory tests.

In the worm stage, worms with uneven development and low viability were removed. Analysis of families was conducted on a sample of 50 cocoons (25 females and 25 males). Families with very low silkiness, cocoon and shell mass were separated and removed.

**Figure 1. Hybrids marked in the worm stage**

Analysis of cocoons for each breed was conducted separately for males and females. According to the family analysis, the cocoons with large shells, high silkiness and cocoons suitable for the cocoon breeds in terms of shape and grain size were selected for the preparation of the initial material batch.

**Research results and their discussion**

At present, the silkworm eggs are being separated by color at the Silk Research Institute. Accordingly, the use of sexed breeds at the egg stage for the preparation of 100% pure hybrids is an urgent issue.

In order to provide an objective assessment of the characteristics of the breeds selected for research, Ipakchi 1 breed, which is widely distributed in our Republic, was selected as a control.

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In order to maximize the effect of heterosis on silkworms, it is necessary to correctly evaluate the morphological, biological and technological indicators of each breed.

**Table 1 S-5, S-10, S-12, S-13, S-14 morphological indicators of the breed**

| **T/r** | The name of the breed | Egg color | Color and shape of cocoons |
|---|---|---|---|
| 1 | S-5 $W_2W_2$ | Female eggs are black, male eggs are light yellow | White, long and thin waist |
| 2 | S-10 $W_3W_3$ | Female egg-black, male-black dark brown | White, long and thin waist |
| 3 | S-12 $W_5W_5$ | Female eggs are black, male eggs are brown | White, oval-round |
| 4 | S-13 $W_2W_2$ | Female eggs are black, male eggs are white and yellow | White, oval-round |
| 5 | S-14 $W_3W_3$ | Female egg-black, male - black-brown | White, long and thin waist |
| 6 | Ipakchi 1 (q) | Brown gray | White, oval circle |

The table shows the genes that determine the color of the eggs, along with the silkworm breed. W2W2 gene causes light yellow color of male eggs, W3W3 gene causes black-brown color, and W5W5 gene causes brown color. Color is very important when distinguishing eggs by eye color, because the brighter the color of the male eggs, the easier and more accurate it is to distinguish them. In this case, it is easier to distinguish between C-5 W2W2 and C-13 W2W2-breeds, whose male eggs are pale yellow. However, if a special device is created that separates the eggs according to their color, it does not matter how light or dark the color is. Accordingly, all selected breeds can be used in hybridization. Biological and some technological parameters of the researched silkworm breeds are presented in Table 2.

**Table 2 S-5, S-10, S-12, S-13 va S-14 the main biological and technological indicators of breeds**

| № t/r | The name of the breed | Eggs come to life, % | The viability of worms, % | Average weight | | Cocoon silkiness, % | Metric number of cocoon thread, m/g |
|---|---|---|---|---|---|---|---|
| | | | | Cocoon, g | Shell mg | | |
| 1 | S-5 | 95,7 | 84,4 | 1,64 | 392 | 23,9 | 3055 |
| 2 | S-10 | 93,5 | 82,6 | 1,43 | 329 | 23,0 | 3436 |
| 3 | S-12 | 96,1 | 88,5 | 1,53 | 362 | 23,7 | 3412 |
| 4 | S-13 | 94,6 | 88,9 | 1,44 | 328 | 22,8 | 3548 |
| 5 | S-14 | 93,7 | 88,2 | 1,46 | 341 | 23,4 | 3073 |
| 6 | Ipakchi 1 (nazorat) | 95,5 | 92,8 | 2,0 | 421 | 21,0 | 3247 |

As can be seen from the data in the table, some indicators of the sexed breeds at the egg stage are slightly lower than the control vpriant. For example, egg viability in the studied breeds is between 93.5-96.1 %, in the control 95.5 %; viability of worms 82.6-88.9 %, in control 92.8 %; the mass of the cocoon is 1.43-1.64 g, in the control it is 2.0 g.

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The reason for this is that the chromosomes in the genomes of the C-5, C-10, C-12, C-13, C-14 breeds are genetically modified breeds. However, the silkiness of the cocoons of these breeds is much higher than the silkiness of the cocoons of the Silky 1 breed in the control variant, 22.8-23.9 %, and 21.0 % in the control variant, the thinness of the cocoon thread is the same as the control variant 3055 -3548 m/g and in the control it is 3247 m/g.

Worldwide, silkworm diseases are one of the main obstacles to the production of quality silkworm eggs and increased cocoon productivity. To do this, we studied studies on the disease resistance of sexed breeds at the egg stage. According to the results of this study, 2 of the 6 tested breeds, i.e. S-13, S-14, were found to be the most resistant to pebrina and yellow diseases. therefore, they are considered sufficiently resistant to diseases.

It is also known that viability, tendency to heterosis and parthenogenesis are mostly controlled by the same genes. The selection work done to increase one of these indicators will increase other indicators in parallel [14]. Therefore, the propensity of sexed breeds to parthenogenesis has been tested before. Of the sexed breeds, the output of parthenogenetic worms is 2.1-3.0%, and this indicator is quite high.

Conclusion Our republic has a unique climate, which differs from the climate of countries with high temperature and low humidity located in the Eastern and South-Eastern regions. Therefore, when feeding silkworms, it is necessary to choose effective varieties of mulberry, to prepare special worm houses separately and to ensure the necessary temperature and humidity in them.

Thus, based on the above, researched breeds can be used in hybridization. The biological parameters of S-5, S-10, S-12, S-13 and S-14 breeds, sexed by egg color, are almost at the same level as the parameters of the control variant. Best of all, the participation of the above sexed breeds in hybridization allows for the preparation of 100 % pure hybrids and leads to the maximum manifestation of heterosis. Simplifies the process of preparing silkworm eggs and causes a significant increase in cocoon productivity.

The use of new hybrids created on the basis of gender-specified breeds in industrial sericulture has significant economic benefits.

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