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QUALITY ASSESSMENT OF SILKWORM SEED LOT AT SILKWORM BREEDING ENTERPRISES

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Abstract
The transition of our country's economy to market relations demands an improvement in the quality of agricultural products and elevating them to a level where they can compete in the global market. In this regard, an important task for the workers of the sericulture sector is to prepare high-quality silkworms that meet world standards. To achieve this, it is necessary to strictly follow the sericulture agrotechnics to obtain silkworms with clean cocoons that are well-formed, long, slender, and free from defects. Unfortunately, it is known that a significant number of defective silkworms are present even in purebred silkworm groups and are delivered to silkworm reception points.

Keywords: Silkworm, defective silkworms, slender fiber, mulberry silkworm, diseases, purebred silkworms, sericulture factory.

Introduction

The presence of defective silkworms in delivered batches results in an increase in non-standard and unsuitable silkworms, leading to economic losses for silkworm breeders. Furthermore, defective silkworms contribute to a reduction in the volume of silk raw material and deteriorate the quality of silk fiber. As a result, the value of raw silk produced in Uzbekistan's sericulture factories remains very low.

It is known that some of the silkworms that have spun their cocoons are defective, which leads to difficulties in winding the cocoon and extracting the silk fiber. The presence of defective silkworms leads to a decrease in the productivity of silkworm breeders and their income. The occurrence of defective silkworms in purebred batches leads to the manifestation of this defect in the next generations. The percentage of silkworms with defects such as spots, pairs, and others, as well as their negative impact, has not been sufficiently studied.A review of the literature on sericulture indicates that there is very little research in this area.Indian researchers, analyzing the works of A.G. Kafian (1963), suggested that the presence of paired cocoons could be caused by the hereditary characteristics of the breed and the compatibility of different genders of silkworms. Thus, it is not advisable to use moths derived from paired cocoons in breeding enterprises.

According to V.V. Odikadze (1966), in Georgia, defective silkworms are found among the industrial silkworms. Even under experimental conditions, 2-4% of the silkworms spun by the worms are defective. The author has found that most of the silkworms inside the cocoons with liver spots are diseased. Such silkworms lead to a decline in the quality of breeding silkworms.O.V. Oziashvili and V.I. Gadakhabadze (1967) identified that among the silkworms

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delivered to the Tsulukidze main sericulture station, the share of yellow-spotted silkworms was 4.7%, and the raw silk yield from such silkworms was 19.6%, while their winding efficiency was 35.1%. In normal silkworm batches, these indicators were 35.1% and 75.2%, respectively. It is known that there are various defective silkworms in batches, including those with loose ends. K.V. Kratsashvili (1970) noted that the occurrence of loose-ended silkworms is due to insufficient nutrition during silkworm rearing.K. Tsoi and O.B. Lezhenko (1985) reported that among the industrial silkworm batches, silkworms with silk cocoons infected with various spots are the most common. Their occurrence is caused by diseases such as nuclear polyhedrosis and flasheria. According to the authors, in Japan, a sorting machine has been developed that separates silkworms with internal and external spots, with defective silkworms being collected in a separate bunker.N.A. Akhmedov (1986) analyzed the silkworms delivered to the sericulture factories and reported the presence of 4.1% chaff silkworms, 3.1% spotted silkworms, 1.7% paired silkworms, 2.4% thin-shelled cocoons, and 1.4% loose-ended silkworms.M. Bozorov (1985) analyzed the industrial silkworms of the Tashkent region and found that chaff and paired silkworms significantly reduced the productivity of silk production and raw silk yield. Therefore, the author recommends separating such silkworms.P.R. Ismatullaev, L.F. Akshov, B. Normatov, S.S. Nigmatkhodjaev (1988) created a mechanism for separating chaff and paired silkworms from silkworm batches. This device would be suitable for sorting purebred silkworm batches.Based on the research outlined above, studying the composition of silkworm batches, identifying the percentage of defective silkworms, and assessing them have been addressed in previous works, but the causes of defective silkworms have not been fully explained. Meanwhile, defective silkworms are also found in batches delivered to breeding stations and silkworm breeding enterprises. Our experiments fully confirm this situation.In breeding farms, well-fed silkworms raised at a moderate temperature and protected from various infectious diseases produce high-quality silkworms.It is known that the quality of silkworm eggs prepared at breeding enterprises depends largely on the composition of the purebred silkworm batches delivered to these enterprises. Usually, the composition of the purebred silkworm batches at breeding stations and breeding enterprises is not uniform. They vary in terms of purebred, hybrid, and defective silkworms.Our experiments aim to identify the composition of silkworm batches delivered to Guang Tong LLC and analyze the impact of defective silkworms on the quality of the prepared eggs and provide necessary recommendations. The defective silkworms in the batches can be divided into two categories:

a)Chaff,paired,spottedsilkworms.

b) Silkworms with altered shapes.

If you need further assistance or adjustments, let me know!

Table1 Identification of the main types of defective silkworms and their proportion in the batches of silkworms delivered to sericulture factories during the season.

Types of defects in cocoon batches	**"Proportion of cocoons, %."**		
	At the beginning of the season	**In the middle of the season**	**At the end of the season**
Raw (unripe) silkworms	4,2	4,4	4,3
Double cocoons	3,4	3,7	3,5
Atlas cocoons	3,1	3,4	3,3
Thin-shelled cocoons	3,8	4,0	3,9
Stained cocoons	4,7	5,1	4,9
Moth-eaten cocoons	5,3	5,6	5,4
Other defective cocoons.	4,1	4,6	4,3
Hybrid cocoons	71,3	69,2	70,4
The share of defective cocoons	28,7	30,8	29,6

Inspection of Defective Silkworms Delivered to Sericulture Factories

Inspection of defective silkworms delivered to sericulture factories showed that not all silkworms with defects in their cocoons are found. The types of defective silkworms, their quantity, and how their proportion changes throughout the silkworm receiving season are noteworthy issues. For this reason, batches of silkworms delivered at the beginning, middle, and end of the season were analyzed. Samples of defective silkworms were collected daily from 10 segments, and these were categorized according to the type of defect. Afterward, the proportion of each type of defective silkworm was determined.

The data in **Table.1** show that, as previously mentioned, there are 14 types of defective silkworms, and among them, 6 types (unprocessed, twin, satin, thin-shelled, stained, and stunted silkworms) were found to be the most common. Each of these types makes up 3-4% of the batch delivered by the silkworm breeders (ranging from 23% to 30% in total). The remaining 8 types of defective silkworms make up 4.1% to 4.6%, and some of these types were found to be absent at times.

The proportion of defective and healthy silkworms changed significantly throughout the receiving season. The highest percentage (30.8%) of defective silkworms was observed in the batches delivered in the middle of the season. The proportion of unprocessed silkworms (5.3%) and stunted silkworms (5.6%) was also higher during this period. The proportion of stained silkworms increased from 4.7% at the beginning of the season to 5.1% by the end of the season. These observations indicate that the proportion of defective silkworms during the season constituted 28-30% of the batches delivered, and sometimes even more. This proves the necessity of fully studying this process so that specialists can take appropriate measures.

Conclusion

From Table 2

The most important conclusion that can be drawn is that more than 1/4 of the products delivered

and accepted at the receiving points consist of low-quality, defective silkworms, which have a very low value. This is a factor that undermines the economic foundations of the industry. It is rare to find a sector in agriculture or industry where 1/4 of its output is defective. Clearly, an extremely important task for the silkworm industry in our republic is to increase the production of healthy silkworms to 90-95%. To identify the causes of defective silkworms, it is essential to know the quantitative indicators for each type. Therefore, samples were taken from the defective silkworms delivered to the sericulture factories, classified according to type, and the proportion of each type of defective silkworm was studied.

Table 2 Types of Defective Silkworms and Their Proportions

Types of defects	**The share of defective cocoons, %**		
	At the beginning of the season	**In the middle of the season**	**At the end of the season**
Spotted cocoons	14,6	14,3	14,5
Thin-shelled and underdeveloped cocoons	12,0	12,0	11,9
Double cocoons	11,0	11,0	11,1
Caterpillar-like cocoons	13,2	13,0	13,2
Atlas-like cocoons	16,4	16,5	16,6
Black dirt	18,5	18,2	18,2
Cocoons with other defects	14,3	15,0	14,5

The numbers in the table indicate that the majority of defective silkworms are those with thin cocoons, silkworms that have not fully fed, stained silkworms (11.9–12.0%), defective silkworms with stunted growth (14.3–14.6%), and silkworms with shell defects (13.0–13.2%). Silkworms classified under twin, satin, and black-cocoon categories make up 11.0-18.5% of the defective batch, and other types of defective silkworms make up 14.3-15.0%. Silkworms in the defective category cannot be reprocessed, which makes it difficult to extract high-quality silk fibers from them. While the proportions of defective silkworms vary slightly throughout the receiving season, the differences are not statistically significant. Most importantly, the proportion of defective silkworms (28.7-30.8%, and in some regions, 30-32%) has been increasing year by year, causing significant economic damage to the sector and farmers.The only way to reduce the proportion of defective silkworms is by identifying the causes of their defects. It is crucial to understand how environmental factors (temperature, humidity, air exchange in the silkworm hatchery, feeding area, and amount of food) influence the occurrence of defective silkworms. We consider this the most important aspect of the research, and we plan to focus on this in future investigations.According to N.A. Ahmedov (2004), silkworms are very sensitive and reactive during the cocooning period, and even a slight disturbance or environmental change can negatively impact them. The author suggests that if the conditions

for cocooning are slightly altered, the silkworms will continue to spin the cocoon, but the process of silk fiber extrusion will be disrupted, affecting the technological properties of the silk.

The cocooning conditions include various factors: at the end of the fifth instar, when silkworms have fully fed, they start spinning their cocoon in a group for about 3 days. During this period, factors such as temperature, humidity, light, air exchange in the hatchery, the type and quantity of the groups, and other environmental conditions influence the spinning of the cocoon. These factors can affect the silkworms individually or together. Therefore, we studied the effect of environmental factors and group types on the quality of the cocoon.Among the environmental factors, temperature and relative humidity are the most significant, as they directly influence the speed, condition, and quality of the cocoon, as well as the proportion of healthy and defective silkworms.Experiments conducted to study the cocooning process show that if the temperature in the hatchery is below the required level, the cocooning period is extended to 6 days, and only 86% of the silkworms spin their cocoons.

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