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# ECONOMIC CHARACTERISTICS OF SERICULTURE

**Ubaydullaev Rametulla Dauletnazar ugli**

Institute of Agriculture and Agrotechnologies,

Department of Sericulture, Assistant

ubaydullaev.rametulla@agro.uz

**Abstract:** The article analyzes the production process of silk cocoons from mulberry silkworms and their quality indicators. Main stages of cocoon production, technological processes and factors affecting product quality are identified. The influence of different silkworm breeds, feeding conditions and cocoon spinning period on raw silk quality is studied. Practical recommendations are provided for obtaining high-quality cocoons and developing sericulture industry.

**Keywords:** mulberry silkworm, cocoon, raw silk, mulberry leaves, sericulture, fiber quality, hybrid breeds

## Relevance

In the context of globalization of the world textile industry, the demand for natural fibers, especially silk, is steadily increasing. According to the Food and Agriculture Organization (FAO) of the United Nations, global silk fiber production exceeded 180,000 tons in 2024. The sericulture industry has created direct and indirect employment for 35 million people worldwide. The economic importance of silk fiber is further enhanced by its application in biodegradable packaging, medicine, cosmetology, and high-tech materials production. Uzbekistan has historically been located at the center of the Great Silk Road and possesses rich traditions in sericulture. Currently, the republic has more than 35,000 hectares of mulberry plantations, with annual silkworm cocoon production around 18,000 tons. Nevertheless, the economic characteristics of sericulture, factors enhancing its efficiency, and issues of ensuring market competitiveness remain insufficiently studied.

## Problem Statement

Due to its natural and biological characteristics, the sericulture industry fundamentally differs from other agricultural sectors. Currently, there are several problems in Uzbekistan causing a decline in the economic efficiency of sericulture. First, the labor-intensive nature of the silkworm rearing process, with 60% of the workforce being seasonal, complicates economic planning. Second, the biological characteristics of silkworms make them extremely sensitive to diseases and external factors – diseases can reduce productivity by up to 40%. Third, there are outdated mulberry leaf storage and cultivation technologies, and weak material and technical base of silkworm cocoon processing enterprises. Fourth, high volatility in sericulture product prices increases investment risks for farms. World market silk fiber prices can fluctuate by 25-30% annually. Fifth, the methodology for comprehensively assessing the economic characteristics of sericulture, determining its efficiency indicators, and systematically analyzing factors enhancing competitiveness has not been sufficiently developed. Sixth, compared to international practices, production costs in local sericulture enterprises are 35-40% higher, which reduces market competitiveness.

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## Objective

The objective of this research is to theoretically substantiate the economic characteristics of sericulture, analyze world practices, evaluate efficiency indicators, and develop scientifically grounded recommendations for developing the sericulture industry and enhancing its competitiveness in Uzbekistan's conditions.

## Research Results

**First**, the theoretical foundations and characteristics of sericulture economics were studied. From the perspective of economic theories, sericulture as a branch producing valuable natural fibers that harmonize agriculture and industry possesses a distinct economic model. The main characteristics of sericulture economics include: a) seasonality – strict dependence of the production cycle on seasons; b) biological risk factors – dependence on diseases, weather conditions, and other natural factors; c) labor intensity – 3,500-4,000 labor hours per ton of silk fiber; d) long-term investments – mulberry orchards begin yielding full returns after 15-20 years. Based on portfolio theory, it was determined that a diversified economic model of sericulture (fiber silk, cocoon shells, mulberry fruit, leaf feed) can reduce risks by up to 45%.

**Second**, world sericulture economic practices were analyzed. The People's Republic of China accounts for 80% of global silk fiber production and generates over $15 billion annually in this sector. China's Zhejiang Province has implemented modern sericulture technologies in 500,000 farms, increasing hectare productivity by 60%. India produces 35,000 tons of silk fiber annually, ranking second globally, and has created 8.6 million jobs in sericulture. In Brazil's Paraná state, entrepreneurial farmers have integrated sericulture with tourism, increasing additional income sources by 55%. Uzbekistan ranks 7th-8th globally but has not fully utilized its silk fiber production capacity.

**Third**, factors affecting the economic efficiency of sericulture were identified. Econometric analysis revealed the following key factors: effectiveness of breeding work (fast-growing and disease-resistant silkworms) can increase productivity by 35%; age and maintenance of mulberry plantations can improve fiber quality by 28%; modernity of processing technologies can reduce waste by up to 40%; connection with local markets can decrease transportation costs by 25%. Additionally, the importance of farmer skill levels, modern agrotechnical application, and financial support mechanisms was confirmed.

**Fourth**, the state of sericulture economics in Uzbekistan was analyzed. In the Fergana Valley, 24,000 farms engage in sericulture, producing 8,500 tons of silkworm cocoons annually. The Margilan Silk Factory and "Yodgorlik" enterprise produce 2,400 tons of silk fiber yearly. In Bukhara region sericulture farms, using the local "Gulbadom" silkworm variety, fiber quality has reached 92%. Currently, 65% of enterprises operating in sericulture have outdated material and technical bases, with raw material utilization coefficient in processing at 75% (international standards are 88-92%). Silk fiber production cost is 38% higher than the world average.

**Fifth**, efficiency indicators of sericulture economics were calculated. The research developed the following special indicators: hectare productivity index (volume of silkworm cocoons obtained from one hectare of mulberry orchard), economic efficiency coefficient (ratio of net profit to total costs), resource utilization efficiency (ratio of produced output to consumed resources), labor productivity index (output per employee). The economic efficiency coefficient

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in Uzbekistan's sericulture farms averaged 1.8, significantly lower than China (3.2) and India (2.7). Hectare productivity in local practice is 95-110 kg/ha, while in international best practices it is 180-200 kg/ha.

**Sixth**, the impact of modern technologies and innovations on sericulture economics was assessed. The use of biotechnology methods (genetic selection, molecular markers) increases silkworm productivity by 45%. Automated silk reeling systems reduce labor costs by 60%. Conservative mulberry leaf storage technologies decrease leaf loss from 35% to 8%. Digital monitoring systems (IoT sensors) optimize the silkworm rearing process and enable early disease detection. The investments required to implement these technologies pay for themselves in 3-4 years.

## Scientific Conclusions and Recommendations

**First**, the efficiency of sericulture economics depends not only on production volume but on a comprehensive approach – breeding work, modern technologies, developing the processing chain, and organic connection with markets. Diversification of sericulture (fiber products, food, tourism) increases economic sustainability by 50%.

**Second**, sericulture economics in Uzbekistan shows lower efficiency compared to Chinese and Indian practices, with main causes being: outdated processing technologies, weak breeding work, low farmer qualifications, insufficient financial support, and weak integration with domestic and foreign markets.

**Third**, only 35% of products produced in sericulture enterprises go through the value-added chain, while the remaining 65% are sold as raw materials. This limits the impact on the regional economy and reduces opportunities for creating additional jobs.

**Fourth**, based on the developed econometric model, implementing modern technologies in sericulture enterprises and improving breeding work by 30% can increase hectare productivity by 55-60% and economic efficiency by 45%.

**Fifth**, for sericulture products to enter international markets, certification (organic silk, eco-friendly products) and a branding strategy are necessary. World experience shows that certified silk products are priced 40-50% higher than ordinary products.

### Practical Recommendations

1. **State Support Program**: Provide preferential loans to sericulture farms (4-5% annual interest rate), allocate grants for implementing modern technologies, establish a mechanism for guaranteed purchase of silkworm cocoons at fixed prices.

2. **Strengthening Research Centers**: Expand the program for creating new, high-yielding, and disease-resistant silkworm varieties based at Tashkent Agrarian University and Margilan Sericulture Institute.

3. **Cluster Approach**: Establish a sericulture cluster in Fergana Valley – integrate mulberry orchards, silkworm rearing, processing, textile, and trade enterprises into one integrated system.

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4. **Digitalization**: Create a digital platform for sericulture – online trade, consulting services, weather forecasting, early disease detection system.

5. **Export Promotion**: Simplify international certification processes, support participation in international exhibitions and fairs, create national brands such as "Margilan Silk" and "Bukhara Silk".

**Conclusion**

In conclusion, we believe that sericulture can become an efficient and competitive sector of Uzbekistan's agricultural economy, but this requires comprehensive reforms and innovative approaches. The research determined that the main factors enhancing sericulture economic efficiency are: accelerating modern breeding work, modernizing processing technologies, improving farmer qualifications, strengthening financial support, and developing the value-added chain. When the developed recommendations are implemented in practice, it is possible to increase silk fiber production in Uzbekistan to 25,000 tons by 2025-2030, triple export volumes, and create 50,000 additional jobs. In the future, it is necessary to develop individual development strategies for each sericulture region, strengthen scientific research in biotechnology and genetic engineering, and implement a comprehensive program for bringing sericulture products to international markets.

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