

THEORETICAL AND METHODOLOGICAL APPROACHES OF INNOVATIVE PROCESSES MANAGEMENT IN SILK PRODUCTION

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Abstract. *The article discusses ways to improve the efficiency and management of innovative processes in sericulture. Numerous studies are underway to ensure employment in rural areas, increase the export potential of the industry, manufacture an assortment of silk products on the world market and increase their competitiveness. Work aimed at improving the technology of silkworm processes through the widespread introduction of complex mechanization and automation will reduce labor costs and improve product quality.*

Keywords: *sericulture industries, resources, efficiency, contractual relationship, investment, export, innovation.*

Introduction

Sericulture is an agricultural sector that breeds silkworms to produce silk cocoons, raw materials for the manufacture of natural silk.

The history of silk totals almost 5 thousand years. In ancient times, in the Himalayas, people drew attention to a butterfly with white wings reaching a size of 6 cm. From the eggs that it lays, caterpillars feed on the leaves of the trees. After 30-40 days, having changed their outfit four times, they begin to secrete a thin thread from special glands, braiding themselves with a thin cocoon. People learned how to unwind cocoons, get shiny, strong thread up to 1000 meters long and make fabric out of it. The favorite food of the caterpillars is the leaves of the mulberry tree (mulberry), therefore the butterfly is called the "mulberry silkworm".

History of silk

For the first time, silkworms were domesticated in China. A breed of butterflies that could not fly was bred. The Chinese epic relates the history of sericulture to the reign of the most ancient dynasties that existed 3 thousand years BC. It is also possible that the use of wild silkworm silk arose independently of Chinese experience in equally distant times in southeast India.

The priority of the discovery of the method for unwinding cocoons belongs to China, where the production of yarn in this way was known for 2700 BC. The ruling elite of the Chinese empire many centuries ago monopolized sericulture in order to obtain the greatest benefits from it. The first information about China's silk trade with other countries dates back to about the fifth century. BC. In any case, the Greek historian and traveler Herodotus, who visited the Northern Black Sea and the countries of the Middle East (including Babylon), knew fabrics of Chinese origin. China's trade with the countries of the Middle East went by sea, in addition, through the Kashgar and Central Asia to the west to the northern shores of the Black Sea, the Great Silk Road ran.

Early II in AD Chinese experience in breeding silkworms was transferred to Korea, then silkworm penetrated into Japan. In the 4th century AD Sericulture spreads in Iran and Central Asia, and in the VIII century. in these countries the art of unwinding cocoons is becoming known. In the VI century. AD Sericulture was transferred to Europe, to Byzantium. In the VIII century. sericulture penetrated from Syria to Spain. In the VIII century. it gained distribution on the Apennine Peninsula, and then in the XIV century. began to develop in France.

Studying the history of sericulture in Central Asia, many tried and are trying to establish the time and place of the appearance of silkworms in Central Asia. Some researchers believe that sericulture penetrated into Central Asia in the IV century. AD from central china. Others suggest that from India, Ferghana could be the homeland of sericulture.

In the 60s of the XIX century. sericulture reached its peak in Central Asia. Great prospects for the development of local sericulture were appreciated by the Russian government. However, during the tsarist years, this industry developed slowly and was wholly dependent on the foreign drainage and silk processing industries. The production of grena, which to a certain extent determines the growth in the production of cocoons, was in the hands of private companies. A large number of them were imported by foreign traders. As a result of competition of imported grains with the local, many grenade factories were closed. The quality of this grena was low, contributed to the spread of silkworm diseases and reduced the productivity of cocoons. The forage base of sericulture was extremely weak. During the imperialist and civil warrior, almost no mulberries were planted, and old trees were cut down for fuel.

By 1930, the private sector was completely supplanted from cocoon harvesting in Uzbekistan, and the development of sericulture became a state monopoly.

The first institution for sericulture - the Central Asian Research Institute of Sericulture - was created on the basis of the Tashkent Sericulture Station in 1927.

In Uzbekistan, domesticated silkworms are bred; in other countries, cocoons of some wild silkworms (oak, aylanthus, castor oil, etc.) are also used. Wild silkworms are named so because they are fed on the outside, directly on the leaves of growing trees or in specially created conditions close to nature.

Production processes in sericulture.

- growing mulberry, which is the only fodder plant for silkworm caterpillars;
- production of grena;
- incubation of grena - revitalization of the testicles of the silkworm;
- feeding of caterpillars;
- primary processing of cocoons - carrots and drying;

Silk - a natural textile thread of animal origin - the product of the allocation of silk glands of silkworm caterpillars when curling cocoons.

Ripe caterpillars do not feed and for 3 days curl cocoons whose shells consist of a continuous silk thread 1000-1500 meters long. On the fourth day after the start of the wave, the caterpillar turns into a chrysalis. Cocoon weighs 1.7-2.3 grams.

Cocoons are the raw material for silk. Cocoons intended for unwinding are stained - they are treated with hot air or steam (at a temperature of 75-80C for 15-20 minutes) to kill the pupa and prevent it from turning into a butterfly, which spoils the cocoon, making an exit hole in it.

Frozen cocoons are dried for 2-3 months on shadow dryers (racks) so that they do not deteriorate during storage.

On the 10th day, the pupae turn into butterflies, which mate immediately after leaving the cocoon. Within 2-3 days, the females lay 500-700 eggs (grena) and die after some time.

Caterpillars are removed from the gena, for which the mulberry is a fodder plant.

Mulberry is a genus of mulberry family trees, of which there are about 24 species that grow in East and Southeast Asia, in southern Europe, in southern North America, partly in Africa. In the south of the European part of Russia and in Central Asia, 4 species of mulberry grow. To feed the silkworm in Uzbekistan, cultivate mulberry mulberry, white mulberry, and silkworm.

For spring feeding of mulberry silkworms, 1-year-old branches are cut annually from mulberries, and for summer-autumn, the upper third of newly grown shoots. Every 4-5 years, mulberries provide a year of rest.

The mulberry is drought-resistant, relatively little demanding on soils, salt-tolerant, and resistant to waterlogging.

Mulberries are planted with plantations and along the borders of land, along the edges of irrigation canals, roads. Plantations are most convenient for maintenance and operation, because they create better conditions for planting growth, caring for them, and using row-spacing for sowing crops.

In the irrigated areas of Central Asia, 5-10 irrigations are carried out during the growing season at the rate of 900-1000 cubic meters. meters of water per 1 hectare.

The productivity of mulberry leaves with high agricultural technology is 9-10 tons per 1 ha of bush plantations; 10-15 kg from one adult tree.

Literature review

The word sericulture has been derived from the Greek word 'sericos' which means 'silk' and the English word "culture" means 'rearing'. Sericulture is the art and science of rearing of silkworms for the production of raw silk and its end product is silk. Silk is referred as "Queen of fabrics" and is well known for its natural colour, purity and unusual lustre. It is natural fabric, animal oriented and produced from silkworm [5]. Sericulture refers to conscious mass-scale rearing of silk producing organisms in order to obtain silk from them [6]. Sericulture is an important labour intensive, agro-based industry providing gainful employment to unemployed/underemployed in the rural and semi-urban areas and facilitates economic development and improvement in the standard of life of the people. Therefore it has turned out to be a highly remunerative cash crop with minimum investment and high dividends. Sericulture is unique for many reasons such as labour intensive in mulberry cultivation and cocoon production and cottage based industry in raw silk, reeling and then highly industrial at last stage of silk production. Sericulture comprises mulberry cultivation, silkworm rearing, egg production, silk reeling and weaving, and then silk marketing. Sericulture originated in China and they kept it secret for over 2000 years before it leaked to India, Korea and other nations in Asia and Europe. Silk culture was widely practised in India during medieval period. It had a flourishing period during the Moghal regime when Kashmir shawls and woven silks were admired in the court of Emperor Akbar.[7] Theoretical issues of Applying of artificial intelligence in the textile industry were researched by Ergashxodjaeva, S. J. and et.al. [14], Yuldashev N.,Tursunov B. [8;9;10;11;12;13] and others.

History of sericulture in the south of Bessarabia

The history of sericulture in the south of Bessarabia is most directly and closely connected with agriculture of the Transdanubian migrants in the Budzhak steppe. During the development of the Black Sea and Budzhak steppes in the late eighteenth and first half of the nineteenth century. the Russian government in every way encouraged the farmers settled on their open spaces (foreign colonists, state peasants, Cossacks, and others) to develop all branches of agriculture characteristic of the southern, steppe, zone, including sericulture.

However, the authorities' long-term efforts to spread this fishing among all these categories of villagers were unsuccessful, although the natural and climatic conditions of both Novorossiya and

Bessarabia favored not only the cultivation of mulberry trees, but also the feeding of silkworms in significant sizes.

In the southern part of Bessarabia, which consisted of Akkerman, Izmail and southern Bender districts, sericulture was rooted only thanks to the Transdanubian immigrants, whose addiction to this occupation, silk fabrics and silk products was a national and everyday feature of Bulgarians and Gagauz, which once again confirmed the east had a strong influence on them, their clothes and home interior.[1]

Before fleeing from the borders of the Ottoman Empire and moving to Southern Bessarabia, women were traditionally engaged in this agricultural trade. Transdanubian settlers began to develop this industry in a new place of their permanent habitat.

The main buyers of surplus sericulture products (especially live cocoons) were Turkish greners. They came annually (in the 20-70s of the XIX century) to the Bulgarian-Gagauz villages in the south of Bessarabia for benign grena. Grinders and gagauzka raised silkworms, the most popular Balkan green breed in those years.

In addition to the Bulgarian and Gagauz women in the south of Bessarabia, some urban women from Armenia (Akkerman, Izmail, Reni, Cahul) were also engaged in silk-breeding. The mined silk was mainly used for dressing stripes for home textile weaving of paper on shirts, and especially on sheets, tablecloths and towels. But since these things were designed for more or less prolonged use, the need for silk yarn arose only from time to time. The smallest amount of silk went on sale and it was sold at the place of production itself at a price of 4 to 5 rubles. ser. for 1000 cocoons and from 10 to 15 rubles. ser. for one spool ("skein", or skein) of unwound silk thread.

In the 50-60s. XIX century Sericulture as a homework was not recorded at all in official information about the villages of the Bulgarians and Gagauz because of their insignificant share in their households.

In 1857, 8 pounds of cocoons (128 kg) were mined in the Bulgarian and Gagauz colonies.

According to A. Zashchuk, sericulture in the settlements of Trans-Danish immigrants in the first half of the XIX century. was more developed than at the beginning of its second half, which he associated with the changes that occurred in their farms: before bread was sown much less, and therefore working hands were cheaper and silkworming was more affordable (and the buyer of live cocoons and raw silk was, as mentioned above).

Due to the increase in overseas demand for bread, its production absorbed all the labor and attention of the settlers, that is, sericulture could not compete with grain production or cattle breeding - the simplest and most familiar industries. In addition, sericulture required simple and tidy rooms, which not all owners had. In the 60-70s. XIX century officials who collected information in the villages of the Bulgarians and Gagauz for reporting to higher

authorities preferred not to mention sericulture, since they considered it to be insignificant.[2]

With the departure to the homeland of a great champion of the development of sericulture in Bessarabia, the Odessa mayor of the Duke E.O. Richelieu, the attention of central and local authorities to this industry began to weaken. Conceived by him as an exemplary silk-making colony, the Parkana colony never took place in that capacity. Its inhabitants, like all Bessarabian Transdanubian settlements, were engaged in sericulture insofar as they needed it for their domestic needs, but not at all to extract income from it in order to increase their well-being. Parkans produced the products that were required by the markets of Bender, Tiraspol, Chisinau, Odessa - bread, fruits, vegetables, meat and dairy products, wine, etc. In the 80s. XIX century in Parkans 52 out of 400 farms were engaged in sericulture.

Silk production in southern Bessarabia in the 70-80s. it also sharply decreased because the greens brought in from Bulgarian lands almost a century ago were almost completely degenerated and silkworms were susceptible to the general disease - pebri me. The Turkish buyer, not finding benign grena, ceased to visit southern Besarabia.

The reason for the decline of sericulture as an auxiliary branch of agriculture was also the increasing saturation of the domestic market with cheap manufactured goods, which led to the gradual crowding out of homespun fabrics (10). However, the economic conditions in the settlements of the Bulgarians and Gagauz in the late 70s - early 80s. XIX century changed: there was a sharp drop in prices for their main commodity - grain bread, droughts and related crop failures that led to social tension in these villages became more frequent, land shortage and landlessness progressed more and more, which led to a deterioration in the material well-being of the settlers. All this could not but worry both local and central authorities.

Measures and means were needed to maintain the material well-being of the rural population, especially in the southwestern provinces of the country.

In 1882, the report of the Kherson governor addressed to Tsar Alexander III suggested that sericulture entrusted to him could serve as one of the means to maintain the welfare of the population: the king ordered to pay attention to this (11). In the years 1884-1894. extensive correspondence has been formed on this issue. The Imperial Agricultural Society of Southern Russia was entrusted with studying this issue locally and finding out how favorable the economic conditions, including Bessarabia, are for the development of sericulture.

In 1885, a sericulture committee was established under this society. The representative of the Ministry of Agriculture and State Property and the secretary of the committee was appointed V.A. Bertenson. Together with the manager of the Tiflis silk-growing station N.N. They studied with Shavrov the state of sericulture in southern Bessarabia (Chadyr-Lung and Komrat volosts of Bendery district, 4 Bulgarian volosts of Ak-

Kerman district and Belgrade zemsky district of Izmail district).

In the places of inspection, they found the following picture: the presence of a large number of preserved mulberry trees, the love of the population for sericulture, superstition and prejudice, closely associated with this branch of the economy, primitive, like a hundred years ago when settlers settled, methods of worm feeding, crowding worms, degenerated greens, lightweight cocoons, etc. Moreover, they found that silkworm breeding is mainly distributed in the Bulgarian and Gagauz villages, but the volumes of raw silk harvested are insignificant, almost not exceeding a month needs.

Both specialists came to the conclusion that Bessarabian sericulture is quite worthy of attention and concern for creating such conditions that would contribute to its development. Everywhere they visited, when asked why the villagers did not feed silkworm in large quantities, the same answer followed: "There is no one to sell silk to, who will sell it to anyone — we will breed silkworm more".

Thus, the lack of sales was undoubtedly one of the main reasons that impeded the development of sericulture in this region. Other reasons were: a lack of mulberry (ie, the feed base is limited); unsatisfactory was the way to preserve the grains (eggs) in the winter and revitalize them in the spring; it was urgent to replace the degenerated grena of the Balkan breed with a new one; this industry, like others, needed to introduce new modern, rational knowledge and techniques in it both in feeding worms and in unwinding cocoons. Antediluvian, manual unwinding gave as a rule raw silk, suitable only for home weaving. Bertenson and Shavrov, who studied the state of sericulture in the south of Bessarabia, submitted their proposals to the Ministry of Agriculture and State Property. There, specific measures were developed to revive sericulture in the south of Bessarabia, which boiled down to the following:

1. Providing the population with benign grena. To this end, they began to write out grena from abroad (Italy) and from the Caucasian silkworm station using the funds of this ministry.

2. Supply of silkworms with planting material, which was obtained from nurseries of state forestries, as well as nurseries of mulberry trees 2–2.5 each arranged in funds of the Ministry in Bolgrad in the villages of Babel, Chadyr-Lunga, Komrat Large orders for planting material for Bessarabia were carried out by the so-called Odessa irrigation fields. The obtained mulberry seedlings were planted in villages in special areas, in the estates of villagers, in school districts.

3. Conducting special courses in sericulture and beekeeping, to which teachers of public schools (elementary grades) were sent as natural then knowledge guides among the people (teachers of Bolfos, Kios and Dimitrov from Comrat and Chadyr-Lunga, and dozens of others acquired knowledge of exemplary sericulture, first in Tiflis, then in Uman, in Bessarabia - in Bender, Bayramcha and Ackerman.

They became intermediaries in the distribution of grena, planting stock, pullers, brief instructions on

worm feeding, and so on. From them, silkworms received free of charge a simplified type of whatnots, pullers and grena. For this, the silkworms pledged to feed, according to the instructions and instructions of the teacher, and to admit to the wormwater all those who are interested in feeding the fellow farmers. As a result of carrying out all these measures, worm feeding practices have improved under the leadership of the zemstvo administrations of the southern districts of Bessarabia, the degenerate local breed of silkworms has been completely replaced by the Italian one, which has spread since 1887, generalized worm diseases have become a rare occurrence, superstition and prejudice began to fade. In the old days, silkworms, fearing the evil eye, did not dare to let outsiders into their worms. Now, in the hope of help and assistance, they not only let in, but also invited, called for a teacher or instructor. Measures were taken to introduce improved silk unwinding machines, each of which cost 50 rubles, while the local teacher from Comrat Gagauz A.F. did not simplify or reduce the cost of the design, reducing the price to 18 rubles. For silkworms it became apparent that it was easier and more expedient to sell raw silk to silk-weaving factories rather than turning it in place in the fabric.

4. The most important event of the committees of silkworms in Moscow and Odessa was the organization of sales of cocoons. With their assistance, buying cocoons from silkworms of the Bulgarian and Gagauz villages in the south of Bessarabia took up the trading house of the Sapozhnikov brothers in Moscow. Through their representatives, these entrepreneurs began to accept any consignment of cocoons. The purchase was made on the spot, which was announced in advance. Silk farming became a profitable business also because the government increased trade duties on raw silk imported into Russia. This incentive measure, in turn, increased the demand for planting material and for grena, which had been distributed free of charge since 1886. Local zemstvo administrations showed great interest in the development of sericulture in the Bender and Akkerman counties. Particularly fruitful was the activity of the Bender district county council and its chairman - F.M. Rzhondkovsky. Zemstvos recruited teachers as temporary instructors who studied sericulture in courses organized by them in various educational institutions, purchased mulberry seedlings for distribution to the population, etc.

Under the influence of the rise of sericulture in the south of Bessarabia, which began on the initiative of the central and local authorities, interest in this industry began to take shape in some other Zemstvos in the Bessarabian province.

The statistics I have collected on the development of silkworm production in the Bulgarian and Gagauz villages of the three southern districts of Bessarabia for the period from 1887 to 1912, that is, for 25 years, indicate the following:

1. If in 1887 only 200 families were engaged in sericulture, then in 1912 - 9.918 sericultivists; an increase of 49.5 times;

2. There were 2818 mulberry trees, 172,000 became; an increase of 60 times;

3. In 1887, 42.8 pounds were extracted, or 684.8 kg of cocoons — in 1912, 1242 pounds, or 30 tons; an increase of 30 times. Approximate cash proceeds from the sale of live cocoons increased from 2,000 rubles. up to 72,000 rubles, or increased 36 times.

Thus, sericulture in the Bulgarian and Gagauz villages, thanks to the assistance of the government and local self-government bodies (zemstvos), went beyond just satisfying the family and domestic needs of the Bulgarians and Gagauzians and turned into commercial and industrial entrepreneurship.

It should also be added that the reviving sericulture in the south of Bessarabia was presented at the Chisinau Agricultural Exhibition of 1889 as an independent department. Representatives from 23 villages (135 exhibitors) brought as exhibits hand and machine-made silk, 134 items of silk products in the amount of 2202 rubles. The sericulture department aroused great interest among both specialists and businessmen, here deals were made for the purchase of sericulture products. Thanks to this exhibition, reliable and constant marketing of cocoons was ensured.

The Exhibition Committee awarded a large group of silkworms participating in the exhibition with silver and bronze medals of the Moscow and Odessa silkworm committees, the Bessarabian assembly of rural owners (from Comrat, Chadyr-Lunga, Kirsov, Valya-Perzhiy, Tvarditsa, Corten, Tomai, Beshalma Nineteen exhibitors were awarded with laurels. In subsequent exhibitions in Bender, Akkerman, Tarutino and at the first regional peasant in Bessarabia, in the village of Korten (Kiryutnya), silkworms demonstrated their achievements and received well-deserved prizes in the e new tools (of little interest to honor and cash prizes).[3]

Achievements of residents in the Bulgarian and Gagauz villages in the field of silkworm development in the following years of the first half of the 20th century not wasted.

In Soviet times, with the completion of collectivization, the conditions of the collective farm system, sericulture went beyond its geographical boundaries and became an obligatory sub-sector in all collective and state farms of Moldova. Other villagers — Moldovans, Ukrainians, Russians, etc., quickly mastered this business.[4]

Sericulture brought substantial income to farms, and the work of silkworm farmers, as a rule, was well paid.

The conventional textile manufacturing process has a long history of converting the natural fiber into useful products including fabric, home textiles, and apparel and more recently into a technical textile through the utilization of special finishing effects (Figure 1).

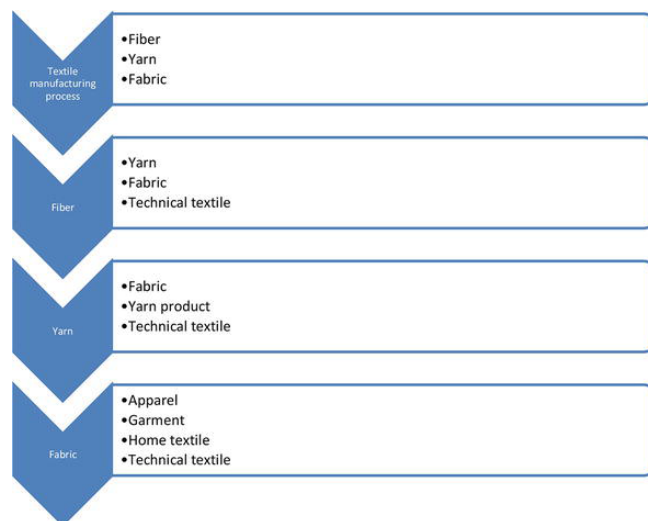


Figure 1. Textile manufacturing process from fiber to fabric

The synthetic and semisynthetic fiber manufacturing is diversified with the utilization of monomer, chemical agent, precursor, catalyst, and a variety of auxiliary chemicals resulting in the formation of fiber or yarn. However, such man-made fibers are perceived as a separate specialized subject and beyond the scope of this book. Therefore, the man-made fiber manufacturing is not discussed.

For comparison, take, for example, 1964: collective and state farms of Moldova produced and sold 580 tons of live cocoons to the state. That year, for example, 49.4 tons were not grown in Edinetsky district, 31.4 tons in Kaushansky, 51.4 tons in Tiraspol, and a specialized team of silkworms for them. Kirov Orhei district (foreman - Palaichuk L.V.) raised 2.5 tons of live cocoons. Bringing considerable income, sericulture in Moldova became the basis for the silk-weaving industry of the republic in the city of Bender.

The innovation in textile manufacturing introduced variety in raw materials and manufacturing processes. Therefore, process control to ensure product quality is desired. Monitoring and controlling of process parameters may introduce reduction in waste, costs, and environmental impact [6].

All the processing stages in textile manufacturing from fiber production to finished fabric are experiencing enhancement in process control and evaluation. It includes textile fiber production and processing through blow room, carding, drawing, and combing; and fabric production including knitted, woven, nonwoven, and subsequent coloration and finishing and apparel manufacturing.

The global textile industry, in yarn and fabric production, has strong presence and experiencing growth. In 2016, the yarn and fabric market was valued at USD 748.1 billion, where the fabric product was more in consumption and contributed 83.7% and the yarn product was at 16.3%. The market consumption is forecasted for growth at CAGR of 5.1% between 2016 and 2021, reaching to a market value of USD 961.0 billion in 2021 [7].

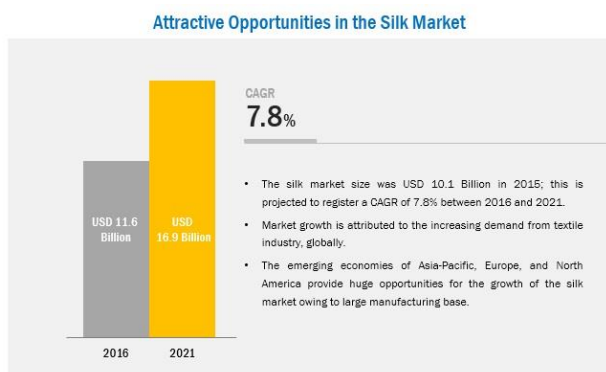


Figure 2. Market Dynamics [4]

The global silk market is projected to be valued at USD 16.94 billion by 2021, at a CAGR of 7.8% from 2016 to 2021. In this study, 2015 has been considered the base year and 2016 to 2021, the forecast period, to estimate the global market of silk. The growing demand in the Asia-Pacific, coupled with the growing demand for textile goods is expected to drive the global silk market during the forecast period.

Drivers

- Technological advancement in sericulture
- Low capital intensive industry

Restraints

- Higher dependency on china for raw material

Opportunities

- High demand from Indian textile industry
- Emerging spider silk

Challenges

- High Cost of Material
- Labor Intensive Industry

Textile application is driving the demand in silk market. Textile is the fastest-growing application of silk. Silk is an important contributor to the textile industry which is continuously growing and evolving in terms of demand and supply. Silk is used in textiles for its lustrous appearance, luxurious feel, lightweight, resilient, and strength. It is used in many types of apparel such as wedding dresses, gowns, blouses, scarves, neckties as well as in many household products such as pillows, wall hangings, draperies, upholstery. Further, Silk's absorbency makes it quite comfortable to wear, especially, in warm weather. Its low conductivity keeps warm air close to the skin during cold weather. This increases the uses of silk for clothing such as shirts, ties, formal dresses, high fashion clothes, lingerie, pajamas, robes, dress suits, sun dresses, and kimonos. In India, silk is also used for making sarees, which is traditional outfit in the country.

The duty of scientists studying the history of the rural population and its occupation is to expand and deepen research on this interesting scientific problem. Well, for those who are in power in modern Moldova and are concerned about the employment of the rural population, sincerely wanting to help its well-being, advice: study the experience of our predecessors, reviving the best of it. Let the authorities remember one thing: as far as the south of historical Bessarabia, with its difficult climatic conditions, is a territorial space, and today, as in past times, it needs the protection of legislation and leadership at all levels

(benefits, investments). Then the results will not slow down. The material presented by us above convincingly testifies to this.

Sericulture in the Republic of Uzbekistan

Sericulture in Uzbekistan is one of the oldest branches of agriculture. It gives textile raw materials - silk thread, which is highly valued due to the special qualities that determine the use of silk in everyday life and technology. Uzbekistan ranks fourth after the PRC, India and Japan. At present, a transition is underway: with market relations, production forms are being improved in agriculture, including me in sericulture. Unfortunately, sericulture is characterized by seasonality and short duration. Incubation of grena takes 15 days, feeding of silkworm caterpillars - 35-40 days, and with high-speed feeding, this period decreases. Repeated feeding will extend the working season and get an additional crop of cocoons. Reducing the cost of silkworm cocoons is an important condition for increasing the profitability of silkworms. The cost of cocoons, like any product, is the sum of the total cost of production costs: grains, pesticides, fertilizers, mulberry leaf, equipment depreciation. The efficiency of sericulture can be significantly improved by improving the organization of procurement and improving product quality. Of all the variety and factors of increasing the efficiency of the production of mulberry cocoons, acceleration of scientific and technological progress and comprehensive industrialization of production, improvement of the management mechanism are of particular importance. There are also many problems in world sericulture. These are periodic ups and downs in demand for natural silk products, and also a low level of mechanization of labor-intensive processes. The main producer of cocoon raw materials - China, does not have serious technical means on the basic technological processes. However, the unique industriousness of the Chinese, high-quality, strict implementation of technological requirements, allows them to maintain world leadership in the production of cocoons and raw silk. The same situation with mechanization in Korea, Vietnam, India, Bulgaria, etc. This is another prerequisite for the need for widespread adoption of the equipment created by us and to improve the technology, the management of innovative processes in sericulture, which will advantageously compete with other countries.

Work aimed at improving the technology of silkworm processes through the widespread introduction of complex mechanization and automation will reduce labor costs and improve product quality. More attractive mechanized labor will reduce staff turnover and give an impetus to more efficient use of the achievements of scientists in sericulture. Naturally, at the initial stage, breeding of silkworm will require significant costs. But only in this case, the farmer can get a significant profit. In the first year of operation, it will be less, but over time, the money invested out of the box will pay off. It should be remembered that the more accurately all the necessary operations for breeding silkworms are carried out, the better the

result, the more caterpillars curled the cocoon, the higher its grade and higher yield. Since forage plays an important role, namely, mulberry leaves, the reduction in the amount of spent feed per unit of production contributes to a significant reduction in the cost of cocoons. Skillful distribution of the sheet allows to reduce its quantity, and compliance with the rules of its preparation - to save feed value. Fertilizing, disinfection is not only an additional cost, but also a real opportunity to increase the productivity of silkworm cocoons, to increase the profitability of production. Naturally, you need the skill that comes with experience. Accuracy, diligence can partially make up for the lack of experience with a novice silkworm. At the present stage of the development of sericulture, silkworm breeding is becoming mainly the occupation of farmers. A family of three to four people, having a converted room with an area of 80 m² and 2 hectares of mulberry plantations, is able to receive 500 kg of silkworm cocoons for five feedings without any outside help. If, however, to procure feed, resort to the labor of hired workers, then productivity will increase. It will increase the profitability of production and the use of premises (for example, film wormworms) for other purposes during the period when the silkworm breeding season has passed. The integration of agriculture with the processing industry has not only economic, but also social significance. It contributes to a fuller use of potential opportunities, increase employment, the emergence of additional sources of income, a sharp decrease in production losses, which is constantly more than 20-35 / 2 of the total number of products produced.

Conclusions/recommendations

The study allows us to draw the following conclusions and suggestions aimed at increasing efficiency in the management of sericulture: in contrast to other branches of agriculture, sericulture is characterized by a short period of production. Silkworm feeding lasts 25-36 days and the final product, the mulberry cocoon, is obtained on the 6th-41st day from its inception. This specific feature of silkworm feeding makes it difficult to transfer it to an industrial basis and slows down the specialization of the industry. More than 85% of silkworm feeding is carried out in residential buildings of farmers; mechanization of labor-intensive processes was hardly used; Uzbekistan has significant potential for feeding cocoons, producing raw silk and silk fabrics; To fully revitalize silkworm caterpillars, you need to provide the required amount of high-quality feed. If in the republic to increase the productivity of mulberry 3-4 times, i.e. up to 100 c / ha, then for those being sold now. 500-620 thousand. Cor.grains enough 55-60 thousand hectares of plantations. To strengthen the silage forage base, it is necessary:

- reconstruct old plantations and plant only intensive type plantations;
- comply with cultivation agricultural techniques, which is possible only on plantations and already using mechanization;

- set the life of linear plantings to 40 years, plantations to 20 years, depreciation rates to 2.5 and 5%, respectively.
- the material stimulus reaches maximum efficiency, firstly, when it corresponds in its level to the resource potential of the economy, and secondly, when it is closely linked to the final results of production.

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