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Technology of Production of Cocoon Raw Materials and Study of Its Impact on Raw Silk Quality

Akhmedov Jakhongir Adkhamovich, Ermatov Shavkat Kulmatovich, Sharipov Jurabek Shomilogli, Sabirov Kuziboy Erkinovich, Ilkhambaev Bobur Sevindek oqli

Tashkent Institute of Textile and Light Industry, DSc., Prof.

Tashkent Institute of Textile and Light Industry, Basic Doctoral Student

Tashkent Institute of Textile and Light Industry, Basic Doctoral Student

Urgench State University, Researcher

Tashkent Institute of Textile and Light Industry, Student

ABSTRACT: This article presents the selection of cocoons grown in the seasons Navruz-1 and Chinese hybrids, the geometric dimensions, shape of the cocoons and the results of individual weeding. Interaction with the external environment for the development of silkworms, silkworms suitable for re-feeding silkworms are recommended to protect the silkworms from the effects of heat during the cool and hot summer.

KEYWORDS: silkworm, cocoon, sorting, cocoon shape, hybrid, geometric size, season, single cocoon weaving, raw silk.

I. INTRODUCTION

One of the main factors in improving the socio-economic situation in the country is the introduction of production in the system of interconnected industries, from the technology of preparation of raw materials to increasing the efficiency of its processing to quality finished products [1].

The silk industry has the potential to produce silk and silk products at the level of domestic and foreign market requirements. However, the quality of the cocoons grown lags behind the requirements of international standards in terms of its continuous length of silk yarn, linear density and other technological parameters.

The connection between the external environment and the silkworm, the external environment means the light and temperature of the sun falling on the environment, the humidity of the air in nature, the composition of the air, the feeding area and the food. In nature, the external environment affects all living organisms. The development of the silkworm is interrelated with the external environment.

Silkworms receive nutrients, oxygen and solar energy from the external environment: for development. At the same time, the worm releases its living products: garbage, water, carbon dioxide and heat into the environment.

Without studying the external environment, it is impossible to develop rational methods of feeding silkworms in the future. In recent years, our advanced cocoons have achieved great practical results in accelerating the rate of worm feeding [3]. They were able to shorten the worm feeding period to 23-25 days instead of 30-33 days. Every organism changes under the influence of the external environment, at the same time this organism also changes the environment around it.

II. METHODOLOGY

Among the environmental factors, we distinguish factors of an aerological nature. These factors include: air temperature and humidity, air exchange, and various forms of radiant energy effects. One of the most important factors is the food, i.e. the quantity and quality of the leaf that is fed to the worm. This factor also depends on the thickness of the worm placement. Interactions with living organisms are also environmental factors [4]. The most important of these factors are microorganisms. But it is incorrect to include in these factors the influence of man on the silkworm, for man consciously changes nature and obeys the highest social laws in his work.



Summer and autumn conditions in the cultivation of cocoons in the reproductive seasons adversely affect the organism of the worm. Good care of the silkworms is necessary to attenuate such effects. Suitable larvae should be isolated for re-worm feeding. The worm should be cool and able to protect the silkworms from the effects of heat during the hot summer months. The walls of such shelters should be thick, the roof plastered with mud, surrounded by trees, and there should be a large ditch that flows quickly near the shelter. If the buildings are in a low-lying area, the buildings on the north and northwest sides should be selected for the wormhole. Outdoor buildings, palaces and porches built in a light type for re-feeding silkworms are absolutely useless. Buildings with large, light, large windows and tin roofs are also not recommended, as such buildings will heat up very quickly under the influence of sunlight if there are no trees around them [5]. Particular attention should be paid to doors and windows when choosing a shelter. It should be borne in mind that by opening the doors and windows of the wormhole at night, not only the air in it is ventilated, but also the building is cooled by the cool effect of the evening. The hot air outside the building should not be allowed to enter the building during the day.

To do this, close the doors and windows of the wormhole. Windows should be covered on the outside with curtains, mats, planks or other materials. The size of the re-worm feeding area is of particular importance. During the hot weather during the day, the silkworms eat the leaves less than at night. Summer-fed silkworms eat more leaves at night and in the morning when the weather is cooler than spring-fed silkworms. The wider the level of worm feeding, the more the silkworms spread and eat the leaf. In summer, silkworms are prone to infections. Some diseases (yellowing, bleeding) are spread by silkworms walking on top of each other and injuring their skin with their nails. The larger the level at which the silkworms are fed, the less sparse the silkworms are and the lower the risk of injury to their skin. The sockets should be made of two and three layers. It is not desirable to make the ridges too high in the summer, as the air in the ridge will get warmer as the roof approaches. The area of the cage should be 15 square meters by the end of the third year for silkworms from a box of seeds, and 60 square meters for silkworms of older age. For repeated worm feeding, this indicated level is considered minimal. Silkworms prepared as above should be thoroughly cleaned and disinfected. In order to maintain the required temperature and humidity in the cages, it is necessary to take measures in the district: first; using cool air at night to cool the worm, then try to keep this cool air during the day by opening the doors and windows of the worm at 9pm, sprinkling plenty of water on the floor and around the worm, and leaving the doors and windows open at night, in the morning it is necessary to sprinkle more water on and around the floor of the hut, if the day is expected to be very hot, spray the walls and ceiling on the south side of the hut, close the doors and windows tightly at 9 o'clock in the morning, the day will not be too hot if the temperature in the shade does not exceed 30 degrees, leave the doors and windows open, hang wet sheets on them and always watch to make sure they do not dry out. When feeding the silkworms from the first to the middle of the third year, wet sheets can be hung on top of the stalks at a height of 10-15 cm to create optimal temperature and humidity. In this case, the daily change in temperature at the worm feeding level will be less than the change in temperature inside the worm [6,7].

One of the most important requirements imposed on cocoon growers by the cocoon processing industry is the supply of cocoon raw materials that are the same in caliber.

One of the requirements for cocoon growers is to supply cocoon raw materials of the same caliber. There are many factors that contribute to the different sizes of cocoons. For example, silkworm rearing methods and cocoons are hybrids and hybrids.

The worm produces silk from sticky substances such as fibroin, sericin, pigment, and wraps up to 40 layers of cocoons around its body. According to the data, one ton of cocoon can produce 350 kilograms of silk, 20,000 meters of adras, 13,000 meters of satin, and in general, dozens of types of products can be made from cocoon fiber. This valuable raw material plays a special role in the further development of our economy, the prosperity of our cities and villages, the well-being of our people.

The analysis of the literature showed that the production of silkworms, silk spinning and quality products (raw silk, yarn, woven and knitted fabrics from them) depends primarily on the quality of raw materials.

Quality cultivation of raw materials for the silk industry depends on silkworm hybrids, breeding, feeding, feeding conditions, feed quality and a number of factors.

Improving these factors requires a high level of cocoon cultivation technology.

The technology of preparation of raw cocoons - feeding silkworms depends on the following external factors:

- air temperature;
- humidity level;
- air exchange;
- quality of mulberry leaf;
- the amount of mulberry leaves;



- feeding area;
- feeding density of silkworms.

Under the influence of these factors, silkworms affect processes such as shortening of the worm cycle, shedding of skin, transition from age to age, eating food and digestion.

The silkworm depends on the type of cold-blooded organism, and its body temperature is zero, depending on the room temperature in which it lives. The body temperature of a young silkworm is equal to the ambient temperature, often 0.3–1.2 °C lower, and in the last V-year it is 0.5–5 °C higher than the ambient temperature [8]. Depending on the body temperature, the slowing down or acceleration of vital processes in the body causes the silkworm feeding period to be much longer or shorter. It was also found that when the feeding period of silkworms lasts longer than 27 days, cocoon yield decreases and feed consumption increases.

When white cocoons and hybrids are fed in the normal way, it is recommended to keep the temperature of the insect air around 23-26 °C as indicated in the current manuals. However, the optimum temperature for silkworms of I, II and III years is 25-26°C; 24-25°C for IV age; 23-25°C for age B and 24-25°C for cocoon wrapping period. When the cocoon wrapping period exceeds the above-mentioned temperature, the cocoon wrapping accelerates, the silkworm's silk separation from the silk gland accelerates, as a result, the cocoon yarn becomes thinner, the silkworm yarn placement deteriorates, the cocoon shell does not roll evenly. This affects the quality of the cocoon shell, making it difficult to process the raw silk.

In recent years, an improved method of feeding silkworms under the film under a new technology has been created in the cultivation of quality cocoons. In this method, the silkworm is kept in a microclimate environment with a polyethylene film between the bottom and the top, which is necessary to maintain a constant uniform air temperature, humidity level and provide quality feed, [9].

In the conditions of our republic, cocoons are grown in an economic way, ie in homes. This poses significant obstacles in regulating the interdependence of silkworm feeding technology with the external environment. Because in the cultivation of cocoons allows the silkworm to be cared for at a young age in the warm rooms of the house in the prescribed norms. However, due to the lack of standardized feeding areas in the adult years of the silkworm, they are forced to use barns, sheds and other vacant warehouses. It is these ages of quality cocoon cultivation that are important for the industry, including the period when silkworms grow, silk glands are formed, silk is synthesized as needed, and most importantly, cocoon wrapping. The temperature is very hot during the day and much cooler in the evening. Such a sharp difference in temperature during the development of the silkworm has a negative impact on its biological and technological performance [10]. High temperatures cause the silkworm to accelerate, resulting in the thinning of the silk yarn, and conversely, the thickening increases the unevenness of the yarn. Therefore, the production of industrial cocoons is urgent.

One of the measures taken in silkworm breeding to improve the nutritional conditions of silkworms, the consumption of mulberry leaves and its assimilation in the cultivation of cocoons involves the use of various biological stimulants. Depending on their properties in the application of biological stimulants, mulberry leaves were sprayed on mulberry trees a few days before feeding to silkworms, or cut mulberry leaves were moistened and treated before feeding to silkworms. Cultivation of high quality cocoons by improving the nutritional quality of mulberry leaves is very important today [11].

Research results: In our study, we sampled 40 kg of dry cocoons from local and Chinese hybrid cocoons grown seasonally in Surkhandarya region and presented the results in a histogram.

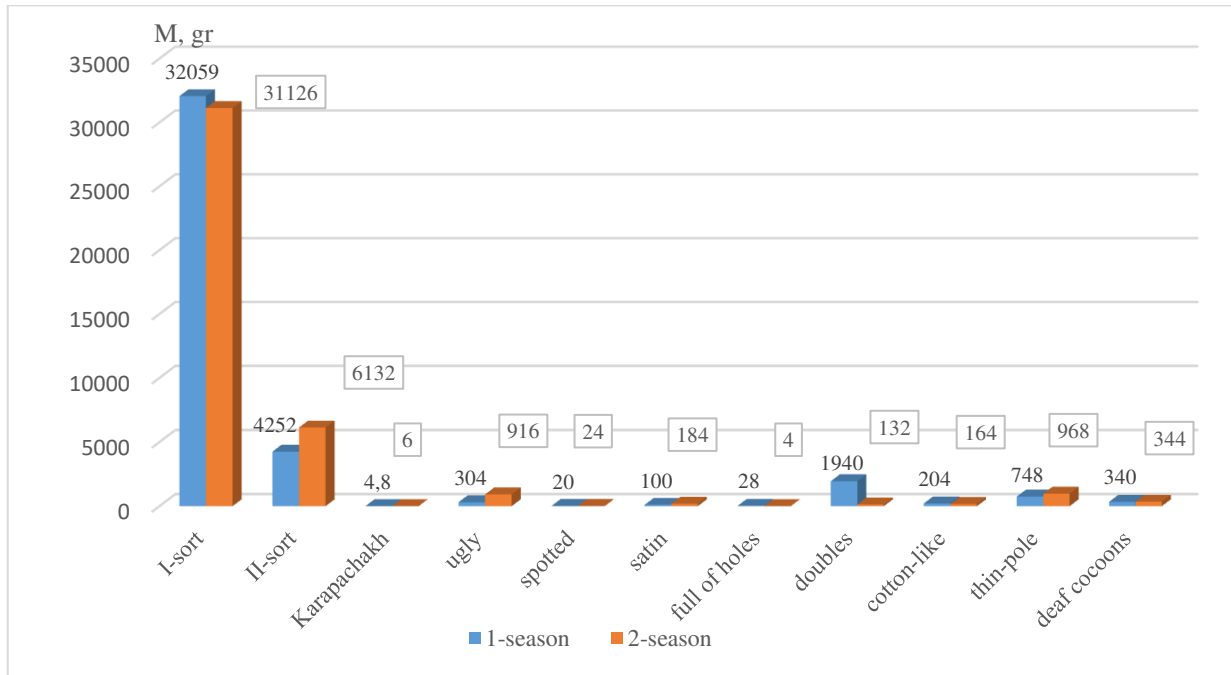


Fig.1. Results of cocoon sorting

The mean values of local Navruz-1 and Chinese hybrid cocoons differed from each other in length, hemisphere width, and waist width. The Navruz-1 hybrid had a cocoon length of 32 mm to 33 mm, a greater percentage. In the Chinese hybrid, the cocoon length from 24 mm to 30 mm was more. The length and caliber of locally grown Navruz-1 hybrid cocoons are much higher than those of Chinese hybrid cocoons. The content of medium-caliber (17-19 mm) cocoons in the local Navruz-1 hybrid cocoons was 95%, which reduces the technological process of calibration of cocoons in preparation for reeling [12, 13, 14].

Results of geometric measurements of cocoon hybrids

Table 2

№	Cocoon hybrids	Cocoon length, mm D	Diameter of cocoon parts, mm			$d_{sp} = \frac{d_{low} + d_{mag}}{2}$	caliber	Thinning coefficient, C_{th}	interception rate, C_i	Forms of cocoons
			d_{head}	d_{lower}	d_{inter}					
Season 1, 2021										
1	Navruz-1	32	16	18	17	17	medium	1,8	0,9	oval
2	China	30	15	17	16	16	small	1,6	0,9	oval
Season 2, 2021										
1	Navruz-1	30	17	18	16	17	medium	1,7	1	cyl.
2	China	28	14	16	15	15	small	1,8	1	cyl.
Season 3, 2021										
1	Navruz-1	29	15	16	15	15	small	1,8	1,03	The waist is thin oval
2	China	28	14	15	14	14	small	1,9	1,03	The waist is thin



Season4, 2021										
1	Navruz-1	27	15	16	15	15	small	1,7	1,03	The waist is thin oval
2	China	26	15	16	15	15	small	1,6	1,03	The waist is thin oval

Technological research was carried out in the laboratory of the department of "Silk Technology" TITLI on a single cocoon reeling machine in the system "UzNIIShP". The average yield of silk products and other technological parameters were determined by 50 tests in accordance with the requirements of the technological map and are given in the fig2.

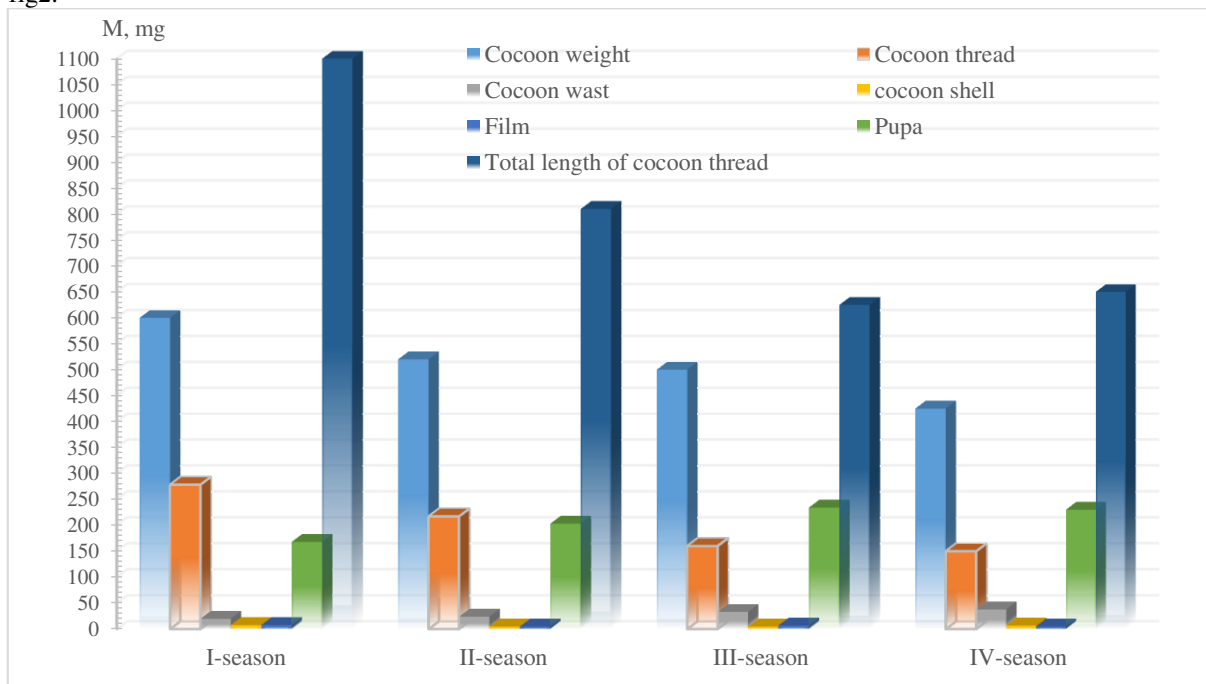


Fig. 2. Indicators of individual cocoon reeling

III.CONCLUSIONS

It was found that the high temperatures of spring and autumn have a significant effect on the technological properties of mulberry silkworms; Although the extreme hot air temperature did not affect the shape of the cocoons, a decrease in their caliber was observed; In summer and autumn, a decrease in the yield of raw silk from cocoons grown was observed, as was the thinning of the fiber and an increase in the number of breaks during spinning; In the selection of cocoons grown for the seasons, there was an increase in the number of defective cocoons. If farms and worm breeders follow the recommendations given completely and in a timely manner, silkworm diseases will allow to grow quality cocoons.

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