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Preliminary Processing of Cocoons on the Basis of Ecologically Clean Electrotechnological Methods

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Abstract:

The article presents the results of the primary processing of cocoons in silk production based on environmentally friendly electrotechnology with ultraviolet radiation.

Keywords: living cocoon, ultraviolet radiation, irradiation distance, UVL wavelength, irradiation time, environmentally friendly technology.

Resolution of the President of the Republic of Uzbekistan dated July 31, 2019 No PP-4411 "On additional measures to develop deep processing in the silk industry" and the President of the Republic of Uzbekistan dated September 2, 2020 No PF-6059 "Measures for further development of silkworm breeding This law is the basis for the implementation of the tasks set out in the Decree "On measures" and other regulations related to this activity[1].

The silkworm moth inside the cocoons admitted to the cocoon processing plants is alive. Before taking silk from the cocoon, ie sending the cocoon to the spinning mills, the sponge must be anesthetized and dried. Because the process of separation and processing of silk fiber from cocoons is complex and carried out continuously throughout the year, the cocoons have to be stored for a long time in these enterprises. Only when the sponge inside the cocoon is anesthetized and dried can the cocoon be stored all year round. If the cocoon is not anesthetized and dried during the initial processing, the silkworm will turn into a butterfly and pierce the shell, making the cocoon unusable. If the silkworm cocoon is not dried after anesthesia, the wet cocoon will quickly mold and the cocoon quality indicators will deteriorate.

To date, certain positive results have been achieved in improving the quality of silk obtained from cocoons by anesthetizing mulberry silkworm moth and creating new methods of drying cocoons, treating the cocoon with primary electrophysical effects, justifying their optimal regime and parameters. However, this study did not take into account the resistance of the cocoon to electrophysical quantities (current, electromagnetic field and optical rays, etc.) and did not study the issues of achieving energy savings in anesthetizing the sponge by direct exposure to the sponge inside the cocoon[2].

During the initial processing of the cocoon, the physicochemical properties of fibroin and sericin in the cocoon shell and the natural technological properties of the silk fiber must be maintained[3].

The protein compounds in the cocoon are composed of fibroin and sericin, and its molecule is made up of a chain of high numbers of amino acids. The longer these molecules are, the better the

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elasticity and flexibility of the silk. Fibroin enzymes increase the resistance of silk fiber to external influences and ensure that it is insoluble in alcohol, ether and other solutions. The fibroin enzyme is resistant to weak acids and swells in water, but retains its structure. [3, 4].

Due to the fact that sericin, which binds several fibroin fibers, is composed of proteins, its physical-mechanical, chemical and technological properties depend on the modes of drying and storage conditions of the cocoon during the initial processing [5].

A lot of research work has been carried out to create a new method and device for the process of anesthesia of mulberry silkworm moth and drying cocoons, to determine their optimal regimes, and a number of methods of primary processing of cocoons are being used in practice. These methods are divided into two groups depending on the technology of anesthesia and drying of mulberry silkworm larvae, either separately or simultaneously [6].

To the first group - mulberry silkworm fungus is anesthetized only. Dumb anesthetized cocoons are dried on racks placed in the shade. This method of anesthetizing mulberry silkworm larvae involves treatment using hot steam, chemicals, sealing, gamma rays, and storage in a cold environment [7].

To the second group - the drying process is carried out in parallel with the anesthesia of mulberry silkworm larvae. This method of anesthetizing and drying mulberry silkworm moth is achieved by processing it in sunlight, in vacuum-formed working chambers, in electromagnetic fields of different frequencies, in high-temperature hot air (convective) and under the influence of optical rays [8].

Much of the research to date has focused on methods of anesthetizing mulberry silkworm moths and drying wet cocoons, as well as improving cocoon silk production technology.

Currently, chemical treatment is a method of anesthetizing a live cocoon, which is processed in special chambers under the influence of chemicals, aimed at stopping the life of the poison by inhalation. In this method, too, after the sponge is anesthetized, the cocoons must be dried in a shade dryer for a long time [9].

Yu.L., Jernitsin, G.N. Kukin and V.F., Zatova, S.I. Experiments by Colinkos did not yield a positive result [10].

N.I. Karyagdiev and others used methyl bromide as a fumigant to prevent the cocoon from turning into a butterfly [11].

Scientists of the Uzbek Institute of Silk Research conducted comparative experiments on the treatment of living cocoons with methyl bromide in the aggregate KSK-4.5 [69]. As a result of the experiment, the silkworm cocoon increased by 2.07% and the dry cocoon yield increased by 16.7% and the initial mass of the cocoons decreased by 14.7%. In the sorting of cocoons treated under the influence of methyl bromide, it was found that the yield of type I cocoons decreased and the number of defective cocoons increased. There was also an increase in the amount of bromine compounds in the sorting and silk spinning shops due to frequent violations of the optimal regime of treatment with methyl bromide in the warehouses of cocooning enterprises. The formation of unpleasant odors as a result of increased levels of bromine compounds in the sorting and smelting shops has been found to be harmful to the human body [12]. This method has not been used in industry due to the above shortcomings.

Analyzing the results of scientific research on the improvement of the above methods of primary processing of cocoons in the research laboratory of the Department of Energy of Namangan Engineering and Construction Institute conducted research on the initial treatment of cocoons with ultraviolet light by environmentally friendly electrotechnological methods.

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UVL range A

UVL range B

1-picture

In this practical research, the first ecologically pure electrotechnology was developed for the cocoon sponge, and research was carried out in 7 variants, with practical work with cocoons of the same size for all research variants. In option 1, it was set for control and no processing, in options 2,3,4, ultraviolet light was emitted at different time intervals in the A range. In variants 5,6,7, ultraviolet light is emitted at different time intervals in the B range.

Very good results were obtained in the cocoon cocoon when treated with ultraviolet light. number 12, the number of cocoons killed in variant 6 was 16, in variant 7 all the cocoons were killed.Research shows that in variant 7 we can see that the cocoons inside all the cocoons were killed.

Table 1. **Results of research on initial treatment of cocoons with ultraviolet radiation**

№	Options	Number of cocoons examined (pcs)	Lighting time (min)	Number of extinct mushrooms (pieces)
1	Control	20	-	0
2	UVL range A (254nm)	20	5	10
3	UVL range A (254nm)	20	10	12
4	UVL range A (254nm)	20	15	14
5	UVL range B (280-320nm)	20	5	12
6	UVL range B (280-320nm)	20	10	16
7	UVL range B (280-320nm)	20	15	20

Note: UVL-ultraviolet light

In conclusion, based on the above results, the optimal parameters for the use of ultraviolet light B range to kill fungi instead of chemical treatment were determined, given the complexity of their application to the environment, various human organisms during the initial processing of cocoons,

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causing inconvenience during operation. The processing values of the 7 options shown in Table 1 were found to be optimal parameters.

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