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EFFECTIVENESS OF USING THE BIOPHYSICAL ILLUMINANT IN AGRICULTURE AND TEXTILE INDUSTRY

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Abstract

Use of non-traditional innovative technologies to increase the quality of silk fiber produced in the world, to increase cocoon productivity in agriculture and textile industry. The results of research conducted using a portable biophysical trap are presented, and the quality indicators of silk fiber are compared using samples.

Key words: *Handle, Mulberry variety, leaf, solar cell, feed, Mulberry twigs, electro optic, larva, silkworm, harmful butterflies, light, cocoon, alternative energy, silkworm, specimen, flat, cocoon mass, repeated feeding of worms.*

Introduction:A useful device for controlling bollworms, mulberry moths, fig moths and other harmful flying insects has been created with the help of a pest control device [1]. It is important that the use of a portable biophysical trap working on the basis of new innovative mechatronic systems in the textile and silk industry greatly contributes to the increase of silk quality and yield. A new field of research is emerging in the field of mechatronics-based mobile biophysical handling in the textile and silk industry and will bring a new technological system to the industry. Many species of insects are able to see radiation in a range that is invisible to the human eye. For example, bees and many other insects can see radiation in the ultraviolet range, which helps them find nectar in flowers. Plants that are pollinated by insects are in a state of passion in terms of reproduction and germination if they emit light in the ultraviolet spectrum. Butterflies are also able to see UV light (300-400 nm) and some species even have UV-only markings on their feathers to attract a mate. Ultraviolet fluorescent lamps are an effective means of attracting males and females. So 300-450 nm. in the range diffuse light traps are most effective. Taking into account these scientific principles, our team created a video recorder equipped with fluorescent light tubes powered by a small solar power station in the following scheme, a "portable electro-optical gripper" device that works using special fluorescent light tubes irradiating in the ultraviolet range.

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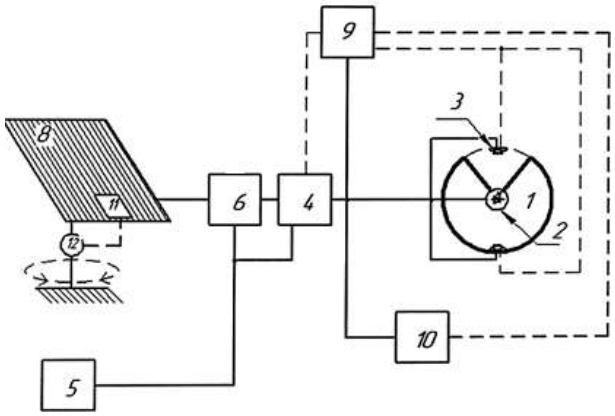


Figure 1: Lighting handle based on mechatronic systems:

1 – Handle body with light working on the basis of mechatronic systems; 2 - fluorescent light tubes; 3 – webcam; 4 - power source on/off switch, 5 - accumulator battery; 6 – charge controller, 8 – photoelectric converter (FEP); 9 – data recorder; 10 – GSM-module; 11 – sensor controlling the solar shift; 12 – cloth-reducer

The benefit of a biophysical trap operating in a mechatronics system in improving productivity

1. According to the theory of operation, the biophysical trap is 4-5 times more useful than other traps;

2. increases the yield of mulberry leaf feed by 15-25%;

3. eliminates the damage of chemical toxic substances that harm the environment;

4. sharply reduced the use of toxic substances;

5. the farmer ensures the safety of the farmers;

6. works automatically day and night;

7. consisting of mechanically strong materials;

8. Increases the growth ability of the mulberry branch by 10-15%;

9.most importantly it works in mobile system [2].

15.02.10 This discovery, which belongs to the mechatronics and mobile robotics industry, is also related to technologies in agriculture and silk industry in killing butterflies.

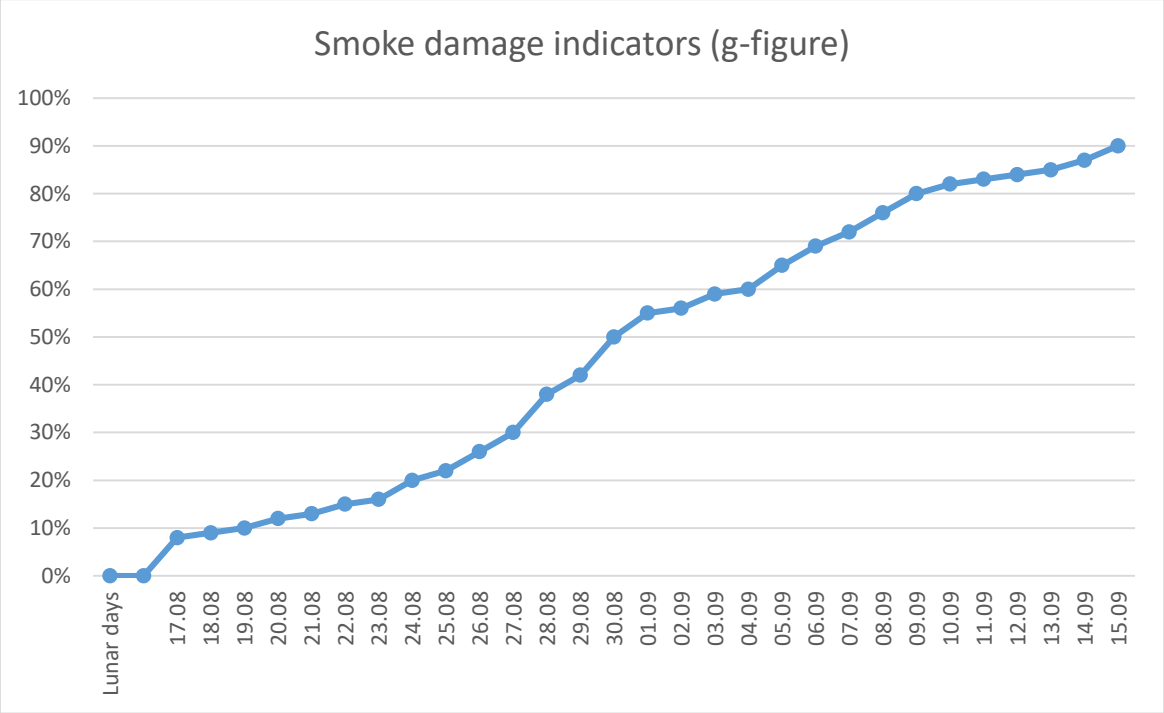
Materials and Methods/Methodology: For the production of textile products in the silk industry, great importance should be paid to the cultivation of cocoons. The

higher the cocoon yield and fiber quality, the higher the quality of yarn and fabric. In our researches, the removal of the mulberry butterfly, which affects the yield of the mulberry leaf, the main food of the silkworm, was carried out using a light trap operating on the basis of mechatronic systems. Pest control is one of the most important aspects in the cultivation of agricultural crops and silkworms, which are silkworm feed. In the regions of Central Asia, the indicator of mulberry yield is decreasing. The reason is that in the cultivation of agricultural crops and mulberry leaf, which is a feed for silk kurti, the damage is caused by the impact of insects, which causes a sharp decrease in productivity [3-7]. One of the most effective methods of destroying the pest flying butterflies is the use of a mechatronic light trap device. It is a mechatronics light trap device that works autonomously day and night. It works on alternative energy, the solar panel moves with the help of mechatronic systems, it automatically charges the battery, it starts automatically at night with the help of light sensors and charges during the day. With the help of this device, the head of Izboskan district "Agra pilla" LLC S. Anorkulov, householder A. Tojiakhmedov household economy In a study conducted on a 4-hectare mulberry plantation, 80% of the leaves were protected from damage by mulberry leaves as food for 1 sample of worms, and the damage was fed daily with mulberry leaves protected from butterflies. (Figures 2, 3)

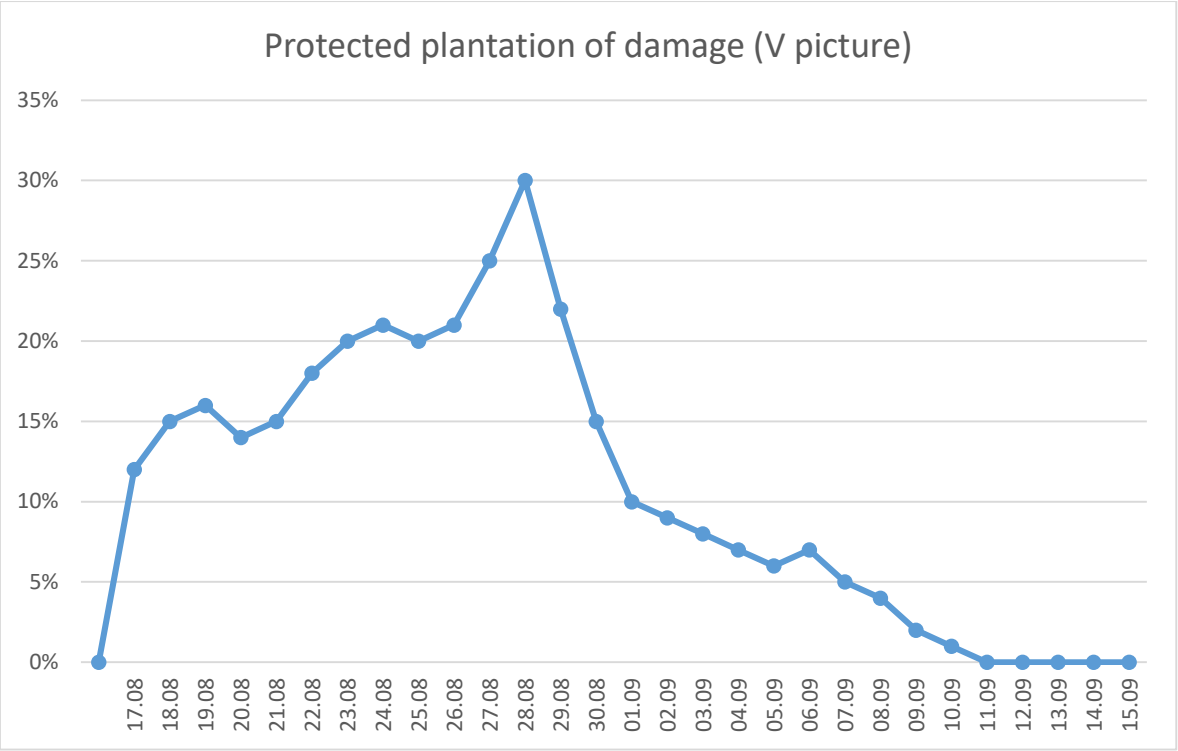
Figure 2: The cocoon can't get enough of the mulberry leaf. **Figure 3:** silkworm cocooning process.

Silkworms of the second sample were fed using mulberry leaf feed obtained from damaged mulberry trees in a research carried out by S. Anorqulov, A. Irisovlarni, head of "Agra pilla" LLC, Izboskan district, in a 2-hectare mulberry plantation, and the level of infestation is 80-90%. Silkworms fed on the food without satisfaction. Damaged mulberry trees (4 photos). Mult zor protected from particles (3 photos)

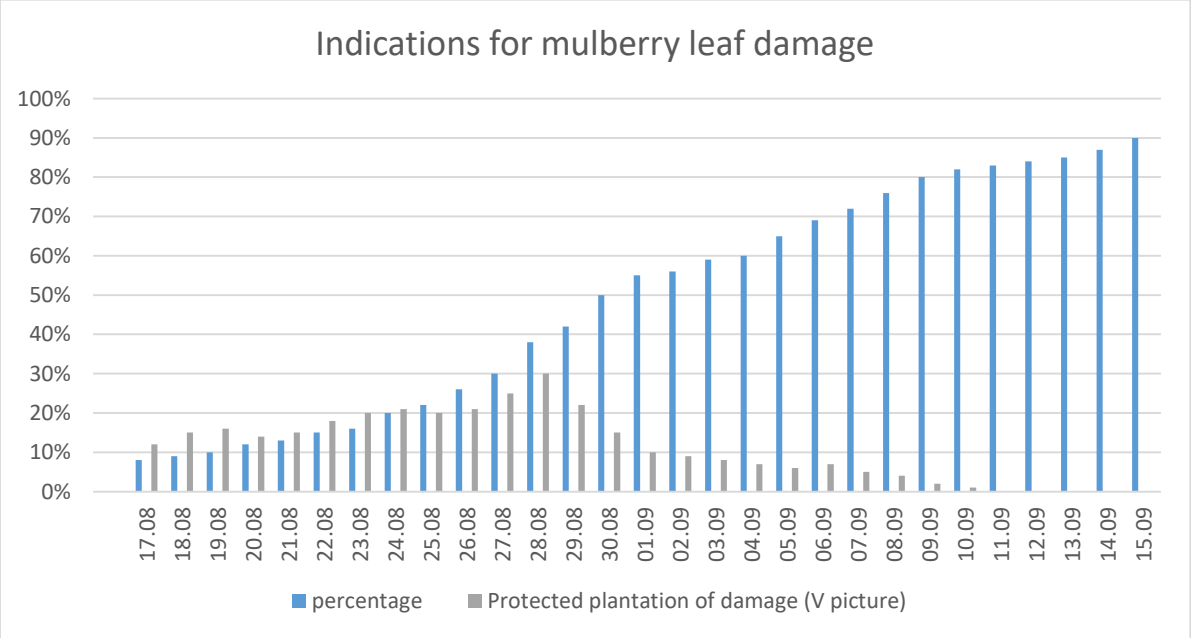
3 Figure: 20-30% of mulberry leaves were damaged **4 Figure:** 80-90% of mulberry leaves were damaged



5 Figure: Plantation damage graph. (Graphic representation of 90% damage rate of damaged mulberry trees in the research conducted in the 2-hectare mulberry plantation of A.Irisovlarni household).



6 Figure: Protected plantation loss graph. (Graphic representation of 30% damage level of mulberry trees in the study conducted in the 4-hectare mulberry plantation of A. Tojiakhmedov household)



7 Figure: Comparison graph of 5-6 pictures (90% damaged mulberru leaves 30% damaged mulberry leaves)

The silkworms of the second sample were fed with the same mulberry leaves. Insufficient nutrition for silk weaving and cocoon quality had a negative effect on cocoon yield and quality. For example, the quality indicators of cocoon samples taken as samples of 1-2 bags are given below (in Table 1-2). From the data in the table, it can be seen that when silkworms were fed with undamaged mulberry leaves, silkworm parameters and productivity traits were slightly higher than when fed with damaged mulberry leaves. For example, in the experimental variants, the weight of the silk gland was 1550–1650 mg, and the volume was 1.55–1.63 cm3, while in the comparative version, this index was 1470–1480 mg, the volume was 1.45–1.48 cm3 , compared to the experimental variants, it was found to be 6.9-11.5% less in weight and 6.9-10.1% less in volume. Therefore, it was found that if the silkworm is fed with undamaged mulberry leaves during the feeding periods of the repeated worm feeding season, the larvae develop well, the growth dynamics, the activity of the silk gland increases, the productivity is high, and it accumulates enough silk material. Analysis of the figures in the table shows that the productivity of worms fed with undamaged mulberry leaves is slightly (1.5–2.5%) higher than that fed with a mixture of infected mulberry leaves. Feeding on intact mulberry leaves was found to shorten the larval period by 0.5–1 day. When the total number of cocoons obtained in the experimental and comparative variants was determined, it was revealed that when silkworms were fed with undamaged mulberry leaves, the index of silk gland activity and wrapped cocoons was equal to 95.0–96.5%, compared to the comparative variant (92.0%) 3 It has been proven to be higher by 0-4.5% [4].

Results and Discussion: The cocoon sector is of great importance in the economy of our country, and it should be noted that in recent years, sufficient attention has been paid to the processing of cocoon raw materials grown on our land, and to the sale of finished and semi-finished products. In 2019, the President of the Republic of Uzbekistan Sh. Mirziyoev's report at a meeting with agricultural workers [10] touched on the cocoon industry of our republic. In it, as a result of the efforts of the last two years, in particular, due to the feeding of silkworms four times a year, the yield of cocoons reached 19 thousand tons. He also noted that there are still a number of problems in the industry: Therefore, as a result of the research we are conducting to improve the quality and yield of silk fiber, which is a strategic raw material, 2 hectares of the homesteader's land were controlled by using biophysical traps to get rid of the mulberry moth, which damages the mulberry leaves, and get the fourth harvest of silkworms, and The silkworm cocoon fed on mulberry leaf here is the 1st sample, and the silkworm cocoon of 2 hectares of land without a handle was marked as the 2nd sample. Obtained results The technological parameters of the cocoons were tested in the scientific laboratory of the Institute of Scientific Inspection of

sample-1 and sample-2 cocoons in bags by the Uzbek Scientific-Research Institute of Natural Fibers Association "Uzbyektekstilprom" and the following results were obtained (tables 1).

Table 1. Results of sorting cocoon samples in 2 samples of 2022 (Andijan)

№ t/r	Sample name	Different defective cocoons, %								
		various	a scar	satin	Spotted	sharp triple	thin-polar	thin-walled	double tone	Others
1	2	3	4	5	6	7	8	9	10	11
1	Example-1	7,04	5,99	2,99	16,47	19,31	12,27	28,99	0,45	6,59
2	Example -2	5,12	5,11	5,37	15,34	8,18	20,97	36,83	0,26	2,82

According to the sorting results, the parameters of sample-1 cocoons differed from the parameters of sample-2 cocoons, for example, satin was 2.99% in sample 1, 5.37% in sample 2. The degree of fine polarity was 12.27% in sample 1, in the sample it was 20.97%. Thin-walled cocoons are 28.99% in the 1st sample, and 36.83% in the 2nd sample. It can be seen that the indicators of cocoons in sample 1 are better and the results of indicators of cocoons in sample 2 are found to be low.

Table 2 Calibration results of 2022 cocoon samples 2 samples

№ t/r	Sample name	Pilla kalibrli, %			
		small (14-15mm)	Average (16-19mm)	big (20-22mm)	Bigger than big (23 mm and larger)
1	2	3	4	5	6
1	Example-1	93,62	6,38	-	-
2	Example -2	100	-	-	-

8 Figure: Sorting of cocoon samples

9 Figure: Calibration of cocoon samples

The results of cocoon calibration were small (14-15 mm) 93.62% in sample 1 and 100% in sample 2. Average (16-19mm) 6.38% in 1st sample, 2nd sample generally likes this size. Large (20-22mm) Larger (23mm and larger) cocoons were not present in both samples because of high infestation rates of mulberry leaf feed during the 4th feeding season.

Table 3. Mass and silkiness of 2022 harvest cocoon samples (Andijan)

№ п/п	Sample code	Cocoon mass, average, g.	Silkiness, average, %
1	2	3	4
1	Example-1	0,618	27,83
2	Example -2	0,516	24,81

10 Figure: Determination of mass of cocoon samples **11 Figure:** Determination of silkiness of cocoon samples

The mass and silkiness of the cocoon samples was 0.618g in the 1st sample and 0.516g in the 2nd sample. It can be seen that the 1st sample has a heavier cocoon mass and a higher silkiness. It can be seen that silkiness is 27.83% in sample 1 and 24.81% in sample 2. An underfed silkworm does not provide the required mass and silkiness in cocooning, which affects quality.Jadval 4 2022 yilgi pilla namunalarining pilla iplarining chiziqli zichligi 2 ta namuna (Andijon)

№ t/r	Sample name	Texas, average	average length of no
1	2	3	4
1	Example-1	0,183	5464
2	Example -2	0,188	5319

The linear density of the cocoon threads in Sample 1 is flat on average 0.183, and the average length is 5464. In sample 2, the average Tex was 0.188, the average length was 5319. It can be seen that sample 1 has higher indicators than sample 2.

12 Figure: **13 Figure:** **14 Figure:**

Table 5 Permanently removable and total yarn length of cocoon samples in 2 samples of 2022 (Andijan)

№ t/r	Sample name	One measurement, average	
		Permanently removable length, m	Total length, m
1	2	3	4
1	Example-1	471	683
2	Example -2	429	533

Continuous stripping and total yarn length of cocoon samples The continuous stripping length of sample 1 is 471 m and the total length is 683 m. In sample 2, the permanently removable length is 429 m, the total length is 533 m. The performance of the first sample is better than the performance of the second sample.

15 Figure:

16 Figure:

Table 6 - yield of silk products of 2022 harvest cocoon samples 2 samples (Andijan)

	Sample name	Product yield, %						Udelnyy satisfaction
		Raw silk	The cocoon is s	Odonka shell	Total silk products	Doll Pupa	Soluble substances	
1	Example-1	23,08	3,08	1,54	27,7	61,22	11,08	4,33
2	Example -2	16,30	4,89	0,82	22,01	55,16	22,83	6,13

The yield of silk products of cocoon samples in sample 1 is raw silk 23.08%, cocoon 3.08%, cocoon shell 1.54%, total silk products 27.7%, Pukolka pura 61.22%, Soluble substances 11.08%, Raw silk is 4.33% in sample 2, raw silk is 16.30%, cocoons are 4.89%, cocoon shell is 0.82%, total silk products are 22.01%, Kukolka pura is 55.16%, soluble substances are 11, 08%, Udyelny satisfaction is 4.33%.

Conclusion: In short, it is important to increase the productivity and nutritional value of mulberry leaf, which is the main food of silkworm, and increase the quality and productivity of cocoon fiber. Andijan region The number of single row mulberry trees in the region is 7144.5 thousand bushes and 5195.6 ha of mulberry groves. Among them, the number of mulberry seedlings planted in autumn 2019 and spring 2020: - single row mulberry trees - 2612.2 thousand bushes; - newly established forest - 145.5 ha; In 2019, 48 thousand 100 boxes of silkworms were cared for and 2 thousand 743.4 tons (103.7 percent) of live cocoons were grown. In 2020, 49,400 boxes of silkworms will be cared for, 2,717 tons of cocoons will be grown. There are 5 cocoon processing enterprises in Andijan region ("Andijan silk KO" MJCH, "Kharir tola" LLC, "Andijan Hanoi silk" LLC, "Sapphir Sanoat" LLC, "Oltinkol gold silk" LLC). 122,900 jobs will be created (including 3,925 permanent jobs and 119,000 seasonal ones)

"Asaka Silk Worm" limited liability company (seed production enterprise) started its work in the field of "Silk worm seed" production at 21 N. Nazarov street, Asaka district, Andijan region, on August 27, 2019. The company's investment project for 2020-2021 is 2 million US dollars, the source of which is planned to be formed: 1 million US dollars from the LLC's own funds, 0.5 million dollars from a foreign investor, and the remaining 0.5 million US dollars from a bank loan. Today, the society invests 0.9 million US dollars at the expense of its own funds and carries out construction and assembly works. In 2020, it is planned to grow 20,000 boxes of silkworm seeds for the enterprise, and in order to fulfill this indicator, 200 boxes of super elite seeds were brought from China and attached to the enterprise in the spring worm breeding season of 2020. 13,000 boxes of silkworm seeds were produced in the massifs of Balıkchi and Oltinkol districts. From this, 2,000 boxes of silkworm seeds were fed in the 3rd and 4th seasons of this year. The remaining 11,000 boxes of silkworm seeds will be fed in the spring season of 2021. It can be seen that cocoon fiber defects, cocoon caliber, cocoon mass, silkiness, average thickness, average length, product yield, were 15-20% better in the place where the bio physical trap was placed compared to the place where it was not placed.

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