EFFECT OF THE MECHATRONIC SYSTEM ON THE SILKWORM FEEDING CYCLE

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Silkworms are a major factor in the feed industry, as their healthy development and the efficiency of the silk production process depend on various environmental and biological factors.[1] modern scientific and technical achievements, including Mechatronic systems, allow us to radically change this process. Automatic monitoring of environmental conditions using mechatronic systems allows you to create ideal conditions for the growth of silkworms.[2,3] This not only optimizes the silk production process, but also significantly improves the quality and quantity of silk.

Along with the introduction of advanced technologies in the field of feeding silkworms, it is important to study the effectiveness of these technologies. Studies show that temperature, humidity, and CO_2 accurately control environmental factors such as silkworms at different stages of development.[4] thus, the use of mechatronic systems makes it possible to control these factors, ensuring healthy growth of the silkworm and, thus, achieving a high level of stability and economic efficiency in the silk industry.

As part of this study, tests were conducted to evaluate the effectiveness of silkworms in controlling environmental conditions by implementing mechatronic systems on multilayer succulents. Mechatronic system, various sensors (temperature, humidity, etc.)$_2$ sensors) and controls that allow you to collect and analyze data in real time.[5] The system is also designed to automatically adjust environmental conditions to a standard level, which helps optimize the silkworm growth process.

In the process of data collection, data from sensors is entered into the database and then analyzed. Temperature and humidity levels are measured every 15 minutes, CO_2 on the other hand, the level is recorded once per hour. This data is essential for understanding how the mechatronic system controls environmental factors and how they affect silkworm development. The analysis process is carried out using statistical programs that ensure the reliability of the results obtained and create a solid basis for drawing scientific conclusions.

The results of the study clearly demonstrated the ability of the mechatronic system to automatically control environmental conditions. Sensor data confirmed that temperature, humidity, and CO_2 levels were under control. The temperature was maintained at an average of about 24.5 ° C, the humidity level did not exceed 75%, and the CO_2 level did not exceed the limit of 400 parts per million. These parameters play an important role in creating ideal conditions for healthy growth of silkworms, which increases their chances of physical development and subsequent production of high-quality silk.

Table 1 temperature required for silkworms at different ages

Age stage	Temperature (°C)
1-young worm	25-27
2-young worm	24-26
3-young worm	24-26
4-young worm	24-26
Chrysalis (jug)	23-24
Adult (butterfly)	23-24

To further confirm the effectiveness of the mechatronic system, the growth rates of silkworms and the quality of silk were also analyzed. The experiment showed that the growth rate of silkworms in the group in which the system was used was 20% higher than that of worms fed using traditional methods. The length and strength of the produced silk are also improved, which clearly indicates the positive effect of the mechatronic system on the process of growing silkworms. These results open up practical potential for the development of the feed industry using advanced technologies.

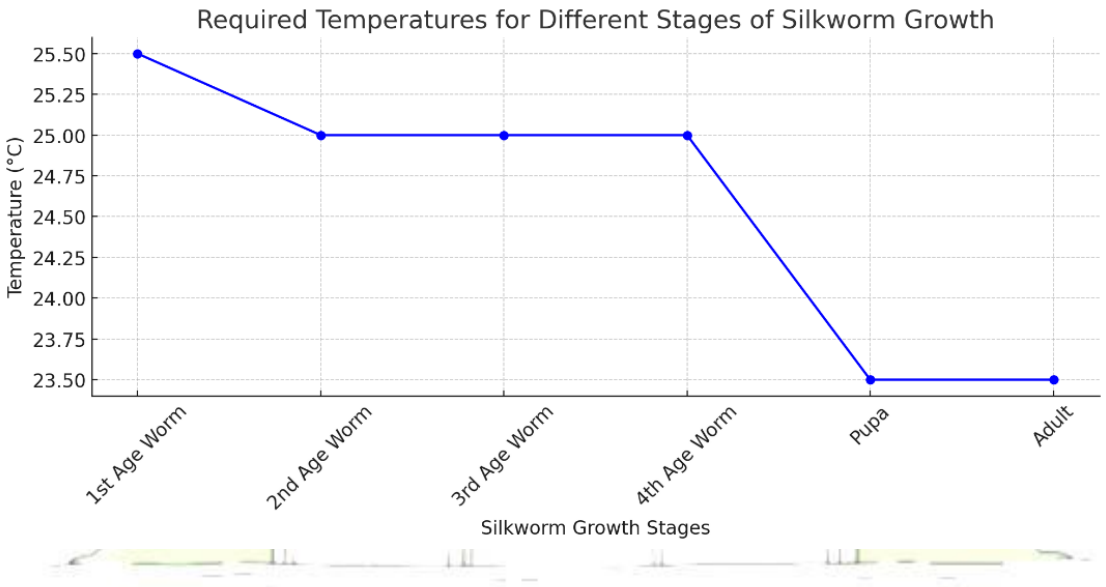

Figure 1. Temperature required for silkworms at different ages

The results of the study demonstrated the effectiveness of mechatronic systems in the care of silkworms. The control of environmental factors had a great impact on the growth of silkworms, which significantly improved the speed and quality of their development. Such technologies help to optimize the silk production process, making the process more predictable and manageable. However, the increased use of mechatronic systems is also associated with important economic factors, such as the cost of initial installation and maintenance requirements, which can pose challenges for small and medium-sized farms.

However, the environmental impact of the system should also be discussed. Mechatronic systems support sustainable feeding practices, minimizing energy consumption and environmental impact. This is an important step towards ensuring the sustainability of the feed industry and promoting environmentally responsible production. Future research should focus on further improving the efficiency of the system, ensuring its cost-effectiveness, and exploring the possibilities of its wider application.

This study clearly demonstrated the effectiveness of mechatronic systems in controlling environmental conditions when keeping silkworms in multicellular succulents. Automatic settings of the system allowed maintaining the temperature, humidity and CO_2 levels in perfect condition, which improved the growing conditions of silkworms and ensured their healthy development. As a result, the quality and quantity of silk produced has significantly improved, which represents a significant advance in the feed industry.

In the future, feeding methods can be further improved with the help of mechatronic systems. Thanks to the use of these technologies, the feed industry can be cost-effective and environmentally friendly. In addition, the widespread use of these systems simplifies the maintenance and management of farms, which contributes to the further development of the industry. The study showed that the use of scientific approaches and modern technologies is a key factor in ensuring the sustainable development of the feeding industry in the future.

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