OPTIMIZING SILKWORM EGG INCUBATION THROUGH MECHATRONICS AND TEMPERATURE REGULATION

Sharibayev Nosir Yusupjanovich
Nasirdinov Bakhodir Abdullajon o'g'li
Sharibayev Soli Yusupjanovich
Namangan engineering and technology Institute

The incubation of silkworm (Bombyx mori) eggs is an important stage in sericulture, necessitating exact temperature regulation to achieve successful hatching. This study explores the optimization of silkworm egg incubation using mechatronic systems and temperature regulation. We discuss the design, implementation, and outcomes of these systems, highlighting their effectiveness in enhancing hatching rates and silkworm health.

The sericulture industry plays a vital role in the global economy, providing high-quality silk. The incubation of silkworm eggs is a fundamental step, and maintaining precise temperature conditions is crucial for hatching success.[1] Traditional incubation methods often lack the required precision, leading to variable hatching rates and suboptimal outcomes. This study investigates the application of mechatronic systems for

temperature regulation to optimize silkworm egg incubation and improve the efficiency of sericulture.[2]

Fig. 1. DHT 22 Sensor of temperature and humidity.

Design and Implementation of Mechatronic Systems: Mechatronic systems used in this study were designed to incorporate Arduino microcontrollers and a network of sensors to monitor and regulate temperature. These systems were configured to maintain a constant temperature within the incubation chambers, ensuring that ideal conditions were consistently met throughout the incubation process.[3]

Experimental Procedure: A series of experiments were conducted, comparing traditional temperature control methods with mechatronic-assisted systems. Temperature data was continuously collected and recorded in both cases. Silkworm eggs were incubated under these conditions, and hatching rates, as well as the overall health of the emerging silkworms, were assessed.[4]

The results of this study revealed a significant improvement in silkworm egg hatching rates when using the mechatronic temperature regulation system. The hatching rates increased by an average of 20%, demonstrating the system's effectiveness. The silkworms hatched in the mechatronic-assisted environment exhibited healthier development, with fewer deformities and higher survival rates.The findings of this study emphasize the potential of mechatronic systems in enhancing silkworm egg incubation through precise temperature regulation. The mechatronic systems offer a level of control and consistency that traditional methods struggle to achieve. The stable maintenance of ideal temperature conditions significantly improves hatching rates, and this, in turn, leads to healthier silkworm populations.

In conclusion, the integration of mechatronic systems for temperature regulation in silkworm egg incubation holds significant promise for the sericulture industry. These systems offer the potential to increase hatching rates and improve the overall health of silkworms, contributing to more efficient and sustainable sericulture practices. Further research and practical implementation of mechatronic systems in commercial hatcheries are needed to fully realize the potential of this technology in sericulture.

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