AGRO-TECHNICAL OPTIMIZATION OF REARING CONDITIONS FOR FINE-FIBER SILKWORM HYBRIDS

Muzaffar Alimkulov
Lecturer, Andijan Institute of Agriculture and Agrotechnologies, Uzbekistan
Ulugbek Akilov
PhD, Senior Researcher, Sericulture Research Institute, Uzbekistan
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Abstract. This study compares two experimental rearing conditions with the conventional (control) method for mulberry silkworm hybrids. Under leaf-deficient conditions, when compared with the traditional rearing method, the survival rate of larvae increased by 1.1–2.0% in the Mayin tola-1 and Mayin tola-2 hybrids, while a slight decrease of 0.1–0.3% was observed in the Navbahor-1 and Navbahor-2 hybrids.

In terms of cocoon weight and silk content, the cocoon weight of Mayin tola-1 and Mayin tola-2 hybrids increased by 0.11 g, whereas in Navbahor-1 and Navbahor-2 hybrids it decreased by 0.04–0.06 g.

Under elevated temperature and humidity conditions, no significant differences were observed in larval survival and cocoon productivity compared to the conventional rearing method.

The results highlight the efficiency of resource-saving rearing techniques in improving silkworm productivity.

Keywords: Mulberry silkworm, hybrid, larval stage, survival rate, cocoon, silk content.

Introduction. In recent years, increasing attention has been given to the introduction of innovative technologies in sericulture and the development of industrial hybrids adapted to local climatic conditions. In Uzbekistan, the Presidential Decree PF-85 (June 5, 2023) emphasized the importance of improving feed resources and developing advanced agro-technical approaches to enhance cocoon productivity and quality.

Previous studies have shown that rearing silkworms under modified conditions, such as feeding under moist cloth or film coverings, helps reduce feed consumption, maintain larval survival, and increase cocoon yield [1]. In particular, the use of humid microenvironments reduces leaf moisture loss, allowing larvae to feed more efficiently and decreasing labor inputs [2].

Environmental factors such as temperature and humidity play a crucial role in silkworm development. Deviations from optimal conditions (25–26°C and 65–

70% relative humidity) negatively affect cocoon formation and productivity [3,4]. It has also been reported that rearing silkworms under film covering can reduce feed consumption up to three times while increasing larval survival and cocoon yield [6].

Furthermore, maintaining optimal environmental conditions throughout larval development is essential, as silkworms pass through five instars within 23–25 days, and their sensitivity to external factors varies across stages [5,7].

Studies on repeated rearing methods indicate that the use of moist cloth and film covering can increase the proportion of high-quality cocoons up to 87% and improve overall productivity [8]. In addition, preserving leaf moisture under covering materials enhances feed utilization efficiency and larval growth [9].

Advanced rearing systems using covered environments have demonstrated higher productivity, improved cocoon quality (90–95%), and increased labor efficiency compared to conventional methods [10].

Therefore, the development of innovative agro-technical methods for rearing locally adapted silkworm hybrids under varying environmental conditions is of significant scientific and practical importance.

Materials and Methods. The study was conducted using fine-fiber industrial hybrids of the mulberry silkworm (Bombyx mori L.) developed at the Sericulture Research Institute, including Mayin tola-1, Mayin tola-2, Navbahor-1, Navbahor-2, and the Japanese × Chinese hybrid (Liangguangzhengjiao) as a control. The experiments were carried out under field conditions in the Qo‘rg‘ontepa district of the Andijan region.

Three different rearing methods were applied. In the first method, leaf-deficient conditions were simulated by feeding larvae twice daily during the 1st and 2nd instars, and four times daily during the 3rd–5th instars. In the second method, larvae were reared under elevated temperature and humidity conditions, with 29°C and 90% relative humidity during early instars and 26°C and 80% relative humidity during later instars. In the third method, conventional rearing conditions were applied, with temperatures of 26°C and 70–75% relative humidity during early instars, and 24°C and 60–65% relative humidity during later instars, with feeding carried out seven times per day.

Results and Discussion. In the present study, five industrial hybrids of the mulberry silkworm (Bombyx mori L.) were reared under different agro-technical conditions, and their biological and productivity traits were comparatively evaluated. The primary objective of the research was to assess the performance

and production potential of newly developed industrial hybrids under practical rearing conditions.

The experimental results confirmed that the applied agro-technical methods had a significant influence on the biological and productivity indicators of the silkworm hybrids. The findings obtained during 2023–2025 are presented in Table 1, which summarizes the comparative performance of the studied hybrids under different rearing conditions.

Table 1. Comparative Survival Rate and Cocoon Productivity of Mulberry Silkworm Hybrids under Different Agro-Technical Conditions (2023–2025)

Hybrids	**Larval Period (days)**	**Survival Rate (%)**	**Cocoon Weight (g)**	**Shell Weight (mg)**	**Silk Content (%)**
		$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$
Leaf-Deficient Conditions (Experiment)					
Mayin tola-1	26.0	93.8 ± 1.32	2.04 ± 0.8	465 ± 31.9	22.9 ± 0.75
Mayin tola-2	26.0	93.7 ± 1.37	1.95 ± 0.7	430 ± 20.5	22.0 ± 0.80
Navbahor-1	26.3	90.7 ± 1.57	1.85 ± 0.13	425 ± 8.4	22.4 ± 0.82
Navbahor-2	26.3	92.9 ± 1.65	1.86 ± 0.2	445 ± 32.1	23.9 ± 0.55
Japanese × Chinese (Control)	28.7	86.0 ± 2.35	1.7 ± 0.2	341 ± 30.2	19.9 ± 1.14
High Temperature and Humidity Conditions (Experiment)					
Mayin tola-1	24. 7	91. 9±0. 76	1.9 ± 0.1	415 ± 35.9	21.7 ± 0.73
Mayin tola-2	25.0	90.6 ± 1.08	1.9 ± 0.3	426 ± 44.4	22.8 ± 1.10
Navbahor-1	25.7	91.3 ± 2.90	1.8 ± 0.1	385 ± 14.1	21.2 ± 1.55
Navbahor-2	26.0	90.2 ± 3.11	1.5 ± 0.2	340 ± 63.4	22.1 ± 0.63
Japanese × Chinese (Control)	28.7	86.0 ± 2.35	1.7 ± 0.2	341 ± 30.2	19.9 ± 1.14

Conventional Conditions (Control)					
Mayin tola-1	26.3	91.8 ± 0.90	1.90 ± 0.4	417 ± 73.3	21.8 ± 0.27
Mayin tola-2	26.3	92.6 ± 1.19	1.84 ± 0.2	419 ± 64.8	22.8 ± 0.41
Navbahor-1	26.7	90.8 ± 1.31	1.89 ± 0.1	413 ± 37.0	21.8 ± 0.61
Navbahor-2	26.7	93.2 ± 1.23	1.93 ± 0.3	420 ± 46.2	21.7 ± 0.71
Japanese × Chinese (Control)	28.7	86.0 ± 2.35	1.7 ± 0.2	341 ± 30.2	19.9 ± 1.14

Analysis of the data presented in Table 1 shows that under leaf-deficient conditions, the survival rate of locally developed hybrids ranged from 90.7% to 93.8%, which was 4.7–7.7% higher than that of the Japanese × Chinese control hybrid. In addition, cocoon weight increased by 0.16–0.34 g, shell weight by 84–124 mg, and silk content by 2.1–3.0%.

Under elevated temperature and humidity conditions, the survival rate of local hybrids was 4.2–5.9% higher than the control. Cocoon weight showed a slight increase (up to 0.2 g in Navbahor-2), while silk content increased by 1.3–2.9%.

Under conventional rearing conditions, locally developed hybrids consistently demonstrated superior performance compared to the control hybrid across all evaluated parameters.

When comparing experimental conditions with the conventional method, leaf-deficient rearing resulted in a 1.1–2.0% increase in survival rate for Mayin tola hybrids, while a slight decrease (0.1–0.3%) was observed in Navbahor hybrids. Cocoon weight increased by 0.11 g in Mayin tola hybrids, whereas a decrease of 0.04–0.06 g was observed in Navbahor hybrids. In contrast, no significant differences in survival rate and cocoon productivity were observed under elevated temperature and humidity conditions compared to the conventional method.

These findings indicate a clear adaptive advantage of locally developed hybrids under resource-limited rearing conditions.

Conclusion. The results demonstrate that agro-technical rearing conditions significantly influence the biological and productivity traits of mulberry silkworm hybrids. The leaf-deficient feeding regime proved to be the most effective,

particularly for Mayin tola hybrids, enhancing survival rate and cocoon productivity. In contrast, elevated temperature and humidity conditions did not result in significant improvements compared to conventional methods. These findings highlight the superior adaptability of locally developed hybrids and their high potential for efficient industrial application under varying environmental conditions.

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