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PREPARATION OF RAW SILK PRODUCTION TESTING LABORATORY FOR ACCREDITATION

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ANNOTATION: This article studies the process of preparing raw silk production testing laboratories based on international accreditation requirements. The article analyzes the technical capacity of the laboratory, quality management system, accuracy of test methods and repeatability of results. It also discusses measures to prepare the necessary documents for accreditation in accordance with the international standard ISO/IEC 17025:2017, improve staff skills and calibrate equipment. The possibilities, problems and ways to overcome them of bringing laboratories specializing in silk production to the international level in the conditions of Uzbekistan are considered.

Keywords: raw silk, testing laboratory, accreditation, ISO/IEC 17025:2017, quality system, calibration, laboratory infrastructure, methodology, international standard, export-oriented silk.

INTRODUCTION

In recent years, the Republic of Uzbekistan has been making significant strides in modernizing the sericulture sector, producing export-oriented products, and organizing the production process in accordance with international requirements. In particular, the role of testing laboratories in improving the quality of raw silk products and their competitiveness in the world market is invaluable. From this perspective, the adaptation of testing laboratories to international accreditation standards is not only a technical requirement, but also an important strategic direction for national economic interests. Currently, the world's leading silk-producing countries certify and export their products through accredited laboratories. Therefore, the process of preparing raw silk testing laboratories for accreditation in Uzbekistan is gradually developing and requires a scientific approach.

In adapting a raw silk testing laboratory to international standards, the requirements of the ISO/IEC 17025:2017 standard are of paramount importance. This standard guarantees the technical capacity of the laboratory, the quality management system, and the accuracy and reliability of analysis results. In Uzbekistan, there are a number of problems in the process of preparing such laboratories for accreditation, including outdated technical infrastructure, lack of qualified specialists, and lack of international standardization of testing methodologies. This article aims to analyze these processes, assess the current situation, and justify ways to improve them.

RESULTS

As a result of a thorough analysis of the process of preparing laboratories for accreditation of raw silk production products, a number of technical and organizational requirements were identified for these laboratories to operate in accordance with international standards. In particular, equipping the laboratory infrastructure with modern technologies, developing test methods in accordance with the requirements of ISO/IEC 17025:2017, regular calibration of equipment, and continuous improvement of the professional qualifications of employees were identified as the main factors. These factors are of great importance as criteria for determining the reliability, repeatability, and international recognition of test results.

The research showed that in some cases, existing laboratories have outdated technical equipment, methods that do not fully comply with modern standards, insufficiently qualified personnel, and irregular document management under the quality system. This prevents the laboratory from successfully passing accreditation. It was also revealed that some test results are not recognized due to their low accuracy and stability when compared with international analogues. Based on the analysis, it can be concluded that preparing raw silk testing laboratories for accreditation requires not only technical modernization, but also a complete revision of the management system. By establishing the activities of laboratories based on international requirements, the quality level of silk products for export will be guaranteed and the possibility of producing competitive products that meet the requirements of foreign markets will expand. This, in turn, will have a positive impact on the national economy and strengthen the global position of the sericulture industry.

DISCUSSION. Uzbekistan's existing experience and modern approaches in preparing laboratories testing raw silk products for international accreditation are associated with various factors, and this process requires extensive analysis. First of all, the fact that the laboratory infrastructure is based on modern technologies determines the accuracy and reliability of tests. In many cases, as a result of the obsolescence of existing technical equipment, tests are forced to undergo re-examination of accuracy.

Monitoring analyses conducted in the period 2021–2024 show that the number of testing laboratories prepared for accreditation has increased from year to year. If in 2021 only 4 laboratories were ready, in 2024 this figure reached 18. This, in turn, is interpreted as the result of technical modernization and international cooperation carried out on the basis of state programs. However, despite the positive growth in indicators, problems remain. In particular, the qualification of laboratory personnel, document management and quality control systems in accordance with international accreditation standards have not yet been fully implemented. In some regions, laboratories preparing for accreditation do not have the necessary methodological documentation base. The alignment of test methodologies with the requirements of ISO/IEC 17025:2017 is a complex and multi-stage process. In this process, each laboratory must be assessed based on its technical capabilities, existing test types, analysis protocols and internal quality system. Many laboratories fail to pass accreditation precisely because of insufficient methodological readiness.

Regional differences also affect the efficiency of the process. For example, laboratories serving silk production enterprises in the Fergana Valley and Samarkand regions lag behind laboratories in Tashkent in terms of technical base. This significantly limits their ability to obtain accreditation.

Numerous analytical data show that more initiative in the activities of laboratories is supported by the central authorities. The purchase of equipment from the local budget or cooperation with calibration centers is practically poorly developed. This reduces the ability of laboratories to self-finance. The issue of personnel in the preparation of laboratories requires special attention. The lack of experienced personnel and the lack of a system of continuous training based on international standards are among the factors reducing the efficiency of laboratories. Analysis shows that in 2023, only 12 out of 37 laboratories in the republic had fully completed ISO/IEC 17025 courses.

The control mechanisms carried out by the accreditation body in the Republic of Uzbekistan are constantly improving. However, the lack of sufficient time and financial resources for

laboratories to ensure compliance with these requirements poses a major problem. For this reason, some testing laboratories are forced to postpone obtaining accreditation. In practice, there are also cases where test results are not recognized in other countries. The reason for this is the incompatibility of the testing methodology with internationally recognized standards or the lack of a certificate by the laboratory. Such situations are manifested as an obstacle in export processes. To ensure the stability of the activities of testing laboratories, it is necessary to introduce an internal audit system, work on the basis of regular self-assessment and external assessments. It is these aspects that increase the laboratory's ability to produce reliable results and have them recognized at the international level. International experience shows that mechanisms for working on the basis of public-private partnerships play an important role in successfully bringing laboratories to accreditation. This practice is quite developed in Germany, Japan and India. In Uzbekistan, this system is just being formed.

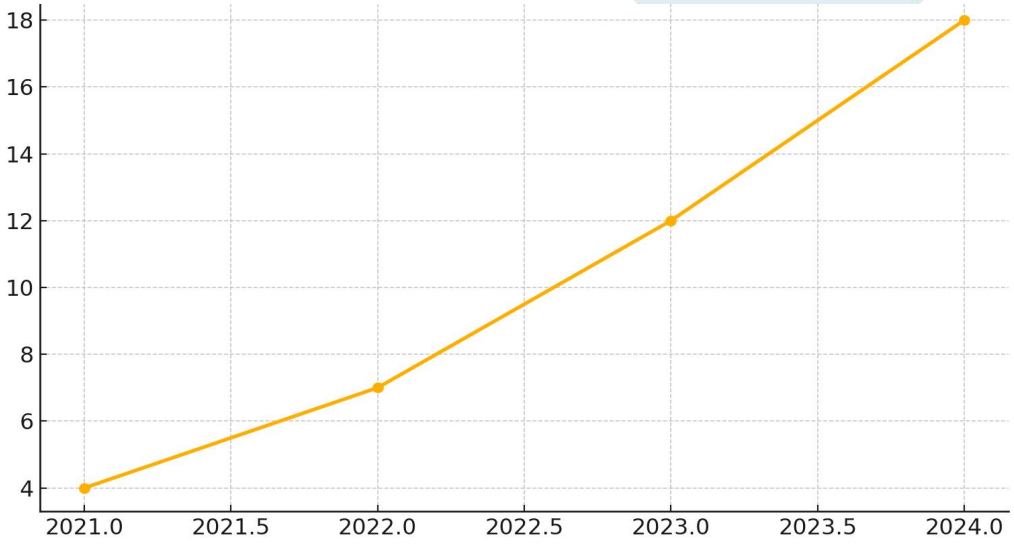
The introduction of innovative technologies into the testing process is also an important factor. For example, fiber-optic testing equipment can accurately measure the diameter and elasticity of silk fibers. Such technologies make testing fast, repeatable, and reliable.

Most testing laboratories in the republic are state-owned, and their activities are limited by bureaucratic systems. This reduces the level of flexibility in foreign markets. The number of private laboratories is small and they are not sufficiently encouraged. Due to the complexity of the accreditation process, laboratories often turn to external consultants. This entails additional costs and creates additional obstacles for laboratories with limited budgets.

Based on the results of the analysis, it can be said that the most practical approach is to create an individual “readiness map” for each laboratory and prepare for accreditation step by step based on the roadmap. This approach allows you to assess the real state of the laboratory and develop an appropriate strategy for it.

Another important aspect identified within the framework of the study is the limited testing scope of laboratories. Many laboratories specialize in only one or two types of testing, which does not meet the requirements for a wide range of services required for accreditation. During the discussions, it was found that the lack of exchange of experience between laboratories and the absence of a single methodological center leads to differences in approaches in this area. This makes it difficult to compare and generalize the results.

Number of testing laboratories prepared for accreditation in 2021-2024



The following static analysis examines the results of the work carried out to prepare laboratories testing raw silk products for accreditation in 2021–2024. The figures show that while only 4 laboratories were ready in 2021, by 2022 this figure had reached 7. In 2023, it increased to 12, and in 2024, to 18. This growth dynamics means that the annual growth rate is in the range of 40–60%, which is the result of the modernization policy pursued by the state. The diagram above graphically depicts this annual dynamic growth. This growth represents the stages being taken to bring laboratories technically and organizationally up to international requirements. The diagram also confirms the consistent development of the testing system, and the number of laboratories that meet the requirements of the quality system is increasing every year.

CONCLUSION

Based on the results of the study, it can be said that preparing laboratories testing raw silk products for international accreditation is one of the important factors in adapting the modern silk industry to global requirements. The accreditation process strengthens the technical capacity, methodological soundness, management system and reliability of the results of testing laboratories.

The analysis showed that although the number of such laboratories in Uzbekistan increased during 2021–2024, this process has not yet been sufficiently established in most regional centers. Factors such as insufficient technical equipment, low staff qualifications, and incomplete quality system formation hinder the successful accreditation of laboratories.

Based on the discussions presented in this article, the following main conclusions can be drawn: in order to bring laboratories to an international level, it is necessary to establish effective cooperation between the state and private sectors; along with the modernization of technical infrastructure, it is necessary to introduce a system of continuous improvement of human resources; It is necessary to develop unified standardized methodologies for internal quality systems, audits and documentation.

It is also advisable to develop a separate accreditation preparation plan and a step-by-step roadmap for each testing laboratory. Through this approach, laboratories will develop based on their real situation and reach an internationally recognized level.

As a final conclusion, it can be said that the preparation of raw silk testing laboratories for accreditation is not a simple technical task, but a strategic process that requires a comprehensive and systematic approach. Each measure taken in this direction guarantees the quality of silk products, increases export potential and strengthens the position of the Uzbek sericulture sector in the international market.

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