AGRI MAGAZINE
(International E-Magazine for Agricultural Articles)
Volume: 02, Issue: 12 (December, 2025)
Available online at http://www.agrimagazine.in
©Agri Magazine, ISSN: 3048-8656

Silk 2.0: How Science and Digital Technology Are Reimagining Sericulture

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Sericulture is one of the oldest agricultural enterprises, but sensors, satellites, smartphones and machine learning are now adding a data layer to its traditional rhythm. This article outlines how digital tools are being applied from rearing room to market, why statistics is essential for making them trustworthy, and what must be done to make them usable for small farm households.

Keywords: digital sericulture, smart farming, IoT sensors, machine learning, traceability

Introduction

From planting mulberry to reeling silk, sericulture has changed slowly for centuries, yet it supports the livelihoods of a very large number of rural families in India. A new layer is now being added: data. We may call the result Silk 2.0, a science-guided and digitally connected industry in which every stage of production leaves a measurable record.

From Rearing Room to Mulberry Garden

Low-cost sensors can log temperature, humidity and carbon dioxide every few minutes, showing exactly when conditions drifted from the ideal, which matters because silkworm health is highly sensitive to climate (Rahmathulla, 2012). Linked to controllers, the same sensors can switch on a fan or humidifier automatically. In the garden, satellite and drone images capture leaf greenness and plant stress so that water and nutrients can be matched to need. Together with soil and weather data, these streams form what researchers call smart farming (Wolfert *et al*., 2017).

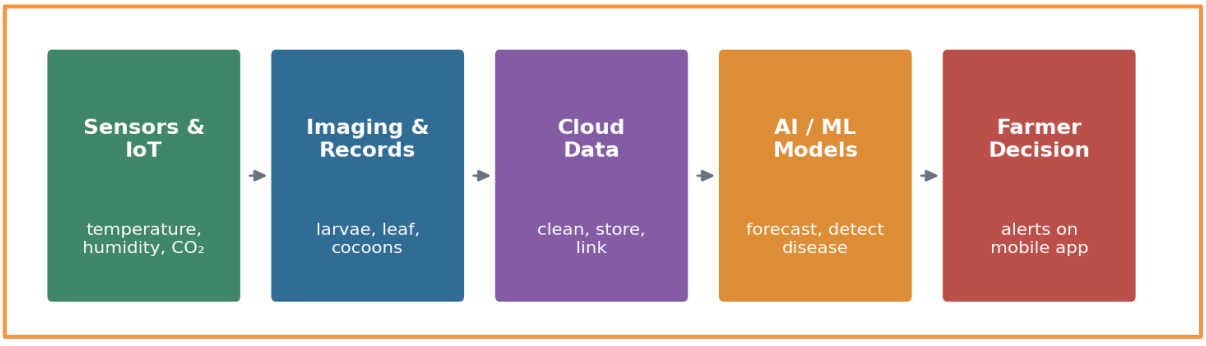

Figure 1: A data pipeline for digital sericulture, with a feedback loop for continuous improvement.

The Thinking Layer

Machine learning supplies the intelligence in the pipeline of Figure 1. Algorithms can:

1. Estimate mulberry leaf yield and forecast cocoon production.

2. Recognise disease from photographs of larvae.
3. Flag batches likely to underperform before the harvest.

Surveys show that deep learning on images often outperforms older techniques when enough good data are available (Kamilaris and Prenafeta-Boldú, 2018; Liakos *et al*., 2018). Digital records also support traceability: attaching a digital identity to a lot of cocoons or a roll of silk lets buyers verify origin and quality, opening premium markets for cooperatives and artisans.

Making It Work

Sensors produce noise and gaps, and a dashboard built on poor data simply produces confident mistakes. Careful sampling, validation on unseen batches and honest reporting of uncertainty separate useful technology from decoration. The human side is equally important. Most sericulture households are small, so tools must be affordable, available in local languages and simple enough for a basic phone. Extension workers and farmer groups will remain the bridge, building on the practical knowledge long recorded in the field (Ullal and Narasimhanna, 1981).

Challenges and Way Forward

Despite its promise, digital sericulture faces practical hurdles. The main priorities are:

1. Affordable sensors and apps designed for small rearing houses.
2. Training for farmers and extension staff in reading and acting on data.
3. Shared, well-organised datasets from many farms so that models learn from varied conditions.
4. Reliable mobile connectivity in rural sericulture belts.
5. Clear rules on who owns and can use the data that farmers generate.

Addressing these points will decide whether Silk 2.0 benefits large units alone or reaches the small households at the heart of the industry.

Table 1: Key terms at a glance

Term	Meaning
IoT sensor	A connected device that logs rearing-room conditions automatically, minute by minute.
Remote sensing	Satellite or drone imaging used to judge the vigour of mulberry plots.
Machine learning	Algorithms that learn patterns from past batches in order to forecast or classify.
Traceability	A digital record linking cocoons or silk to their origin, practices and quality.

Conclusion

Silk 2.0 is not a replacement for traditional skill but a way to give that skill sharper eyes, a longer memory and a faster warning bell. Technology that is validated, affordable and farmer-friendly can raise both the quality and the income of silk.

References

1. Kamilaris, A. and Prenafeta-Boldú, F. X. (2018). Deep learning in agriculture: A survey. *Computers and electronics in agriculture*, **147**, 70-90.
2. Liakos, K. G., Busato, P., Moshou, D., Pearson, S. and Bochtis, D. (2018). Machine learning in agriculture: A review. *Sensors,* **18(8)**, 2674.
3. Rahmathulla, V. K. (2012). Management of climatic factors for successful silkworm (*Bombyx mori* L.) crop and higher silk production: A review. *Psyche: A Journal of Entomology,* Article 121234.
4. Ullal, S. R. and Narasimhanna, M. N. (1981). *Handbook of practical sericulture*. Central Silk Board.
5. Wolfert, S., Ge, L., Verdouw, C. and Bogaardt, M.-J. (2017). Big data in smart farming - A review. *Agricultural Systems,* **153**, 69-80.