



POPULAR SCIENCE ARTICLE

SATHI: Transforming India's seed journey from laboratory to farmer

Ravi Bhushan Prasad^{1*} and Vishal Dinkar²¹ICAR–Indian Agricultural Research Institute (IARI), Assam, Dirpai Chapori, Gogamukh, Dhemaji, Assam–787034, India²ICAR–Indian Institute of Pulses Research (IIPR), Kanpur, Uttar Pradesh, India*Email: bhushanravi72@gmail.com

Received: 03 July 2026
 Revised: 04 July 2026
 Accepted: 06 July 2026
 Published online: 07 July 2026

Article ID: SR01134

Citation: Prasad, R. B., & Dinkar, V. (2026). SATHI: Transforming India's seed journey from laboratory to farmer. *Scientia Review*, 2(7), 11-13

Abstract

Seed is the foundation of agricultural productivity and its quality determines the success of crop production. Ensuring that farmers receive genuine, high-quality seed has always been a major challenge due to the involvement of multiple agencies in seed production, certification, processing, storage and distribution. To address these challenges, the Ministry of Agriculture and Farmers' Welfare, Government of India, in collaboration with the National Informatics Centre (NIC), has developed the SATHI (Seed Traceability, Authentication and Holistic Inventory) portal. SATHI is a comprehensive digital platform that provides end-to-end traceability of seeds from nucleus seed production to the final delivery of certified seed to farmers. The portal integrates research institutions, seed-producing agencies, certification bodies, processing plants, dealers and government organizations into a single digital ecosystem. Through features such as GIS-based monitoring, mobile-enabled field inspections, QR-code-based seed tracking, digital certification, inventory management and real-time monitoring, SATHI enhances transparency, efficiency and accountability in the seed supply chain.

Keywords: Seed, Productivity, Crop production, SATHI, Supply chain

Introduction

Quality seed is often regarded as the most critical input in agriculture because it directly influences crop yield, productivity and profitability. It is estimated that the use of quality seed alone can enhance crop productivity by 15-20 percent, while the adoption of improved crop management practices can further increase production. However, maintaining seed quality across multiple generations from nucleus seed to breeder, foundation and certified seed requires meticulous monitoring, timely inspections and transparent documentation.

Traditionally, much of India's seed certification and inventory management relied on manual paperwork, resulting in delays, duplication of records, limited transparency and difficulties in tracing seed origin. Recognizing the need for a modern digital solution, the Government of India introduced the SATHI (Seed Traceability, Authentication and Holistic Inventory) portal. Launched in April 2023, SATHI represents a major milestone in the digital transformation of India's seed sector by integrating all stakeholders involved in seed production and distribution through a unified online platform.

Why India needed SATHI

India has one of the world's largest seed production systems involving numerous research organizations, State Agricultural Universities, seed corporations, private seed companies, certification agencies, processing plants, dealers and millions of farmers. Managing such a vast network using conventional methods often resulted in delays in approvals, difficulties in monitoring seed quality and inadequate traceability.

The SATHI portal addresses these issues by providing a centralized digital platform that records every stage of the seed production chain, thereby improving efficiency, transparency and accountability.

What is SATHI?

SATHI stands for Seed Traceability, Authentication and Holistic Inventory. It is a centralized online portal developed by the Ministry of Agriculture and Farmers' Welfare, Government of India, in collaboration with the National Informatics Centre (NIC).

The vision of SATHI is to create a complete digital ecosystem capable of monitoring every stage of seed production, certification, inventory

management and distribution while ensuring complete traceability from the point of origin to the farmer.

The development of SATHI has been planned in two phases.

Phase I

The first phase focuses on digitizing the production of breeder, foundation and certified seeds by bringing all stakeholders onto a common digital platform. It captures every transaction involved in seed production while enabling digital field inspections through mobile applications.

Phase II

The second phase introduces complete inventory management and supply chain monitoring. QR-coded seed bags allow real-time tracking of seed movement from production centres to dealers and finally to farmers, thereby establishing complete seed traceability.

Digital transformation of the seed life cycle

One of the most significant achievements of SATHI is the digitization of the entire seed life cycle.

The platform manages:

- Nucleus seed production
- Breeder seed production
- Foundation seed production
- Certified seed production
- Seed processing
- Seed certification
- Seed inventory
- Seed marketing
- Seed sale to farmers

Every activity is digitally recorded, minimizing paperwork and improving operational efficiency.

Integration of multiple stakeholders

SATHI successfully connects every stakeholder involved in India's seed sector, including:

- ICAR institutes
- State Agricultural Universities
- Breeder Seed Production Centres
- Seed Producing Agencies
- Seed Processing Plants
- Seed Certification Agencies
- Seed Dealers
- Farmers
- Government Departments

This integration allows real-time information sharing and coordinated decision-making across the entire seed supply chain.

From nucleus seed to breeder seed

The portal simplifies breeder seed production through digital workflows. Major functions include:

- Online breeder seed indent generation
- Registration of breeder seed production centres
- Digital allocation of breeder seed
- Online breeder seed label generation
- Digital lifting records by indenting agencies

These features improve transparency and reduce administrative delays.

Breeder seed to certified seed

SATHI significantly strengthens seed certification by enabling:

- Online registration of seed growers
- Registration of Seed Producing Agencies (SPAs)
- Registration of Seed Processing Plants (SPPs)
- Digital verification of seed source
- Mobile-based field inspections
- Online processing of inspection reports
- Digital sampling and laboratory testing
- Electronic issue of certification tags
- Billing and fee management
- Interstate permission management
- Digital tag registration
- Downgrading of seed lots when required

Mobile applications allow Seed Certification Inspectors to collect field data even in offline mode, which is synchronized automatically once internet connectivity becomes available.

Comprehensive seed inventory management

An important innovation introduced by SATHI is digital inventory management.

The portal provides:

- Accurate stock management
- Real-time inventory updates
- Automatic blocking of damaged seed lots
- Inventory reconciliation
- Integrated accounting

- Detailed inventory reports
- Better supervision of seed movement

These features help reduce seed losses while ensuring timely availability of quality seed.

Key technological features

Several advanced digital technologies make SATHI a powerful platform:

GIS-enabled monitoring

Integration with the Bharat Map Interface enables geographical visualization of seed production and distribution through GIS-based reports.

Offline mobile application

Field inspectors can perform inspections in remote villages without internet connectivity. Data are automatically synchronized once the device reconnects to the network.

QR-code-based traceability

Each seed bag receives a unique QR code, allowing stakeholders to track its movement throughout the supply chain.

Digital certification

Inspection reports, laboratory testing and tag issuance are completed digitally, reducing paperwork and processing time.

Wallet-based services

Digital financial transactions improve fee management and simplify administrative processes.

Benefits for farmers

Although farmers may not directly interact with every module of SATHI, they are among its greatest beneficiaries.

The portal ensures that farmers receive:

- Genuine certified seed
- Better seed quality
- Improved traceability
- Reduced chances of counterfeit seed
- Faster availability of quality planting material
- Greater confidence in purchased seed

Ultimately, this contributes to higher crop productivity and better farm income.

Benefits for the seed industry

SATHI also benefits seed producers, certification agencies and government departments by:

- Reducing paperwork
- Improving transparency
- Accelerating approvals
- Enabling real-time monitoring
- Enhancing accountability
- Facilitating digital record keeping

- Supporting data-driven policy decisions
- Strengthening regulatory compliance

A step towards Digital Agriculture

SATHI represents an important component of India's Digital Agriculture Mission. By integrating digital technologies such as mobile applications, GIS, QR codes, centralized databases and real-time monitoring, the portal modernizes the country's seed sector while ensuring transparency, efficiency and accountability.

The platform is expected to become the backbone of India's future seed ecosystem, promoting quality assurance and sustainable agricultural development.

Conclusion

The SATHI portal marks a significant advancement in the digital transformation of India's seed sector. By integrating seed production, certification, inventory management, traceability and distribution into a single digital platform, it ensures transparency, operational efficiency and accountability throughout the seed supply chain. The use of modern technologies such as GIS mapping, mobile-based inspections, QR-code tracking and digital certification strengthens seed quality assurance while minimizing delays and human errors. As the platform evolves with the implementation of Phase II, SATHI is expected to revolutionize seed governance, enhance farmers' access to quality seed, improve institutional coordination and contribute significantly to achieving sustainable agricultural growth and national food security.

Conflict of Interest

The authors declare that there are no competing financial or personal interests that could have influenced the work reported in this article.

References

- Department of Agriculture & Farmers Welfare (2023). *SATHI (Seed Traceability, Authentication and Holistic Inventory) Portal*. Ministry of Agriculture & Farmers Welfare, Government of India.
- Ministry of Agriculture & Farmers Welfare (2023). *SATHI Portal User Manual and Operational Guidelines*. Government of India.
- National Informatics Centre (NIC). (2023). *SATHI: Digital Platform for Seed Traceability and Inventory Management*. New Delhi, India.
- Government of India. (2023). *Digital Agriculture Mission: Leveraging Digital Technologies for Indian Agriculture*. Ministry of Agriculture & Farmers Welfare.
- Indian Council of Agricultural Research (ICAR). (2023). *Breeder Seed Production Programme in India*. ICAR, New Delhi.