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(A No. 166) Soil Health Card in India: Transforming Agriculture from the Ground Up

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ABSTRACT

Soil is the foundation of agriculture and the lifeblood of every farmer's livelihood. In India, where agriculture supports almost half of the population and contributes significantly to India's economy, ensuring soil fertility is critical to sustainable food production, rural prosperity, and environmental welfare. Yet decades of continuous cropping, excessive use of chemical fertilizers, monoculture practices, and mismanagement have degraded soil health across vast swathes of farmland. To counter this, the Government of India launched the **Soil Health Card (SHC) Scheme** in **February 2015** as a flagship initiative aimed at scientifically monitoring and improving soil quality.

The Soil Health Card is more than a simple record - it is a **data-driven tool** that provides farmers with detailed information on the nutrient status of their soil and tailored recommendations on fertiliser use, bio-fertilisers, organic amendments, and soil corrective measures. Over nearly a decade since its launch, the SHC scheme has become one of India's most ambitious agricultural reforms, issuing **tens of crores of cards, strengthening soil testing infrastructure, and promoting balanced nutrient management** across the country.

What is the Soil Health Card?

A **Soil Health Card** is a personalized document provided to farmers that shows:

- The **nutrient levels** of their soil - including macro-nutrients such as **Nitrogen (N), Phosphorus (P), Potassium (K)** and sulphur, as well as essential **micro-nutrients** like zinc, iron, copper, manganese and boron;
- **Soil pH, electrical conductivity and organic carbon content**;
- Recommendations on the **type and amount of fertiliser** to be applied;
- Advice on organic inputs, bio-fertilisers, and soil amendment requirements to improve productivity and long-term soil health.

Soil testing is conducted through a vast network of **static, mobile and mini soil testing laboratories** spread across states, which collect and analyse soil samples, and generate the SHC - valid typically for **three years**.

The Government has also developed **digital infrastructure** such as the **Soil Health Card Portal and mobile app**, with QR codes that allow farmers to access their SHC online in **multiple languages**, making it easier to interpret the results and act on recommendations.

Objectives of the Soil Health Card Scheme

The SHC scheme aims to:

1. **Provide farmers with soil nutrient status** and specific fertiliser

recommendations based on scientific testing;

2. Promote **balanced and efficient fertiliser use**, reducing dependency on excessive chemical fertilisers;
3. Strengthen soil testing infrastructure and lab capacity at district and village levels;
4. **Improve crop yields** and overall farm productivity;
5. **Enhance soil fertility** and sustainability of agriculture over the long term;
6. Support **eco-friendly farming** by encouraging organic and integrated nutrient management practices.

These goals reflect a shift from blanket, one-size-fits-all fertiliser application to **site-specific nutrient management**, which can address soil nutrient imbalances and boost agricultural efficiency.

Implementation and Progress

Since its inception in 2015, the Soil Health Card scheme has seen **remarkable expansion**:

- By **2025**, the Government reported having distributed **over 25 crore Soil Health Cards** to farmers across India.
- More than **8,200 soil testing labs** - including static, mobile, mini and village-level facilities - have been established nationwide to ensure timely soil testing and card generation.
- Integration with the **Rashtriya Krishi Vikas Yojana (RKVY)** has strengthened funding, digitization, and monitoring of soil health activities as part of holistic agricultural development.
- Advanced technologies like **GIS-based soil mapping** and **mobile testing units** have enhanced coverage and data quality.

The Government continues to emphasize outreach through digital platforms, extension services, and collaboration with state agriculture departments to ensure timely soil analysis and broad adoption of recommendations.

Impact on Farmers and Agricultural Practices

1. Balanced Fertiliser Use and Cost Savings

One of the most direct impacts of Soil Health Cards is the **shift from excessive fertiliser use to balanced application** based on scientific recommendations. Multiple studies and government data show that:

- Farmers following SHC guidance reduce the use of expensive chemical fertilisers like urea, and instead apply only what the soil needs. This has led to **reduced input costs**.
- The National Productivity Council reported an **8-10% reduction in chemical fertiliser use** as a result of SHC adoption in some regions.

By lowering unnecessary fertiliser expenditure, farmers can improve **profit margins**, particularly for small and marginal farmers who are most sensitive to input cost fluctuations.

2. Increased Crop Productivity and Efficiency

Balanced nutrient management enhances soil fertility and crop yields. Field data and research have highlighted:

- Studies showing that adoption of SHC recommendations can increase yields significantly - for instance, increases of **5-25% in tested areas**.
- A research study in Uttar Pradesh found that farmers who implemented SHC recommendations saw notable increases in yields of wheat, paddy and sugarcane, while also reducing production costs.

Improved yields mean higher production volumes and potential increases in income, contributing to rural livelihoods and food security.

3. Environmental Sustainability

Soil Health Cards contribute to **environmentally sustainable agriculture** by:

- Reducing **nutrient runoff** and groundwater contamination linked to overuse of fertilisers;
- Promoting the use of **organic inputs** and bio-fertilisers to improve soil organic matter and microbial activity;
- Encouraging farmers to adopt practices that **restore soil health over the long term**.

Balanced use of fertilisers also helps mitigate **greenhouse gas emissions** from agricultural soils and reduces the negative impacts of nutrient pollution in water bodies.

4. Improved Awareness and Scientific Farming

The SHC scheme has played a key role in **educating farmers** about soil health, nutrient dynamics, and the importance of site-specific nutrient management. The adoption of digital tools and language-friendly cards has improved farmers' understanding and engagement.

Moreover, extension efforts through agronomy workshops, village campaigns and agriculture helplines help farmers interpret card recommendations and integrate them into crop planning decisions.

Challenges Facing the Scheme

Despite its successes, the Soil Health Card initiative faces several persistent challenges:

1. Awareness and Comprehension Gap

Not all farmers fully understand how to interpret SHC results or apply the guidelines effectively. Research shows that **farmer comprehension of older card formats was low**, and only improved significantly after redesigns and outreach efforts.

Limited awareness limits the scheme's potential to influence farming behaviour across all regions.

2. Infrastructure Limitations

Although thousands of labs exist, **coverage gaps remain**, especially in remote rural areas:

- Soil sample collection and timely testing can be inconsistent due to **staff shortages, logistical constraints or lack of transport**.
- Some labs struggle with outdated equipment or insufficient technical capacity to process large volumes of samples with high precision.

These gaps result in delays in issuing cards - often arriving after key sowing seasons, reducing their practical utility.

3. Scope of Testing

Currently, the SHC scheme focuses on **12 chemical parameters**, which provides valuable nutrient data but may not fully reflect other critical soil health aspects, such as **physical structure or biological properties** (like soil microbial activity). Experts suggest broadening the range of indicators to gain a more holistic understanding of soil health.

4. Implementation Variability Across Regions

In some areas, soil sampling methods and data quality may vary, leading to **generic or one-size-fits-all advice** rather than precise, location-specific guidance. Strengthening standard operating procedures and quality control measures remains essential.

The Way Forward

To increase the Soil Health Card scheme's effectiveness and benefit more farmers, several steps can be taken:

1. Expand Monitoring Parameters

Incorporate **physical and biological indicators** like soil texture, bulk density, water retention, microbial biomass, and enzyme activity to complement chemical analysis and provide a comprehensive soil assessment.

2. Enhance Infrastructure and Capacity

Invest further in soil testing laboratories, mobile units, digital systems, and skilled personnel - especially in hard-to-reach rural pockets - to ensure timely and accurate testing.

3. Strengthen Farmer Engagement and Training

Continuous farmer education through **workshops, field demonstrations, mobile advisories, and community extension programs** can improve comprehension and adoption of SHC recommendations, enabling farmers to make better nutrient management decisions.

4. Tailored Recommendations and Crop Planning Support

Develop more **crop-specific and field-specific guidance** that considers crop rotation patterns, rainfall variability, and soil type diversity to make SHC prescriptions more actionable for farmers.

5. Encourage Organic and Integrated Practices

Promote **bio-fertilizers, green manures, composting and cover cropping** as part of soil care strategies to enhance organic carbon and structural health, besides chemical nutrient balance.

Conclusion

The Soil Health Card scheme represents a **milestone in India's agricultural reforms** - a scientific, data-driven approach that empowers farmers with knowledge about their soil, fosters balanced fertiliser use, enhances productivity, cuts input costs, and promotes sustainability. With over **25 crore cards issued nationwide and ongoing innovations in digital delivery**, it continues to reshape the way Indian agriculture views and manages soil fertility.

However, its long-term success depends on addressing implementation bottlenecks, expanding soil health parameters, strengthening lab infrastructure, bridging the awareness gap, and integrating SHC insights into broader cropping and farm management decisions. As soil health improves, the potential for **higher farm incomes, sustainable land use and resilient agricultural systems** also grows - making the Soil Health Card scheme a cornerstone of India's journey toward sustainable, scientific, and prosperous farming.