

Soil Health Cards and Nutrient Diagnosis in India

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Available online at
www.sunshineagriculture.vitalbiotech.org

Article History

Received: 2. 2.2026

Revised: 6. 2.2026

Accepted: 11. 2.2026

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INTRODUCTION

Soil fertility is the foundation of sustainable agriculture, yet in many regions farmers apply fertilizers without proper knowledge of soil nutrient status. This often leads to nutrient imbalance, declining productivity, and environmental degradation. To address this issue, the Government of India introduced the Soil Health Card (SHC) Scheme as a nationwide initiative to promote scientific nutrient management. The Soil Health Card provides farmers with detailed information about the nutrient status of their soil and recommends appropriate doses of fertilizers and amendments. By linking soil testing with advisory services, the scheme aims to improve crop productivity, reduce input costs, and maintain long-term soil health. Nutrient diagnosis through soil testing is therefore not only a technical tool but also a policy-driven approach to ensure balanced fertilization and sustainable farming systems.



SOIL HEALTH CARD		Name of Laboratory		
Farmer's Details				
Name		SOIL TEST RESULTS		
Address			5. Parameter	Test Unit Rating
Village			1. pH	Value
Sub-District			2. EC	
District			3. Organic Carbon (OC)	
Pin			4. Available Nitrogen (N)	
Aadhaar Number			5. Available Phosphorus (P)	
Mobile Number			6. Available Potassium (K)	
Soil Sample Details			7. Available Sulphur (S)	
Soil Sample Number			8. Available Zinc (Zn)	
Sample Collected on			9. Available Boron (B)	
Survey No.			10. Available Iron (Fe)	
Khasra No. / Chag No.		11. Available Manganese (Mn)		
Farm Size		12. Available Copper (Cu)		
Geo Position (GPS)	Latitude	Longitude		
Irrigated / Rainfed				

Essential & Micro Nutrients Recommendations			Fertilizer Recommendations for Balanced Yield (with Organic Manure)				
Sr. No.	Parameter	Recommendations for Soil Applications	Sr. No.	Crop & Variety	Reference Yield	Fertilizer Combination-1 for NPK	Fertilizer Combination-2 for NPK
1	Sulphur (S)		1	Paddy (Dhaan)			
2	Zinc (Zn)		2				
3	Boron (B)		3				
4	Iron (Fe)		4				
5	Manganese (Mn)		5				
6	Copper (Cu)		6				
General Recommendations							
1. Organic Manure							
2. Biofertiliser							
3. Lime / Gypsum							
International Year of Soils		Healthy Soils for a Healthy Life					
2015							

Figure : Soil Health Card.

2. Concept of Soil Health Cards in India

The Soil Health Card Scheme was launched in 2015 by the Ministry of Agriculture and Farmers' Welfare with the objective of issuing soil health cards to all farmers across the country at regular intervals. The concept is based on systematic soil sampling, laboratory analysis, and personalized nutrient recommendations. Under this program, soil samples are collected from farmers' fields, usually once every two years, and tested for key parameters such as pH, electrical conductivity, organic carbon, and macro- and micronutrients including nitrogen (N), phosphorus (P), potassium (K), sulfur (S), zinc (Zn), iron (Fe), copper (Cu), manganese (Mn), and boron (B).

The Soil Health Card acts as a “medical report” for soil, providing crop-wise fertilizer recommendations and suggestions for soil amendments such as lime or gypsum where necessary. The scheme integrates digital platforms and mobile applications, enabling easier data storage and access. Extension agencies, agricultural universities, and local laboratories play a significant role in implementation. The core idea is to shift farmers from generalized fertilizer use to site-specific nutrient management, ensuring that nutrients are applied according to actual soil requirements rather than guesswork.

3. Nutrient Diagnosis through Soil Testing

Nutrient diagnosis involves evaluating soil chemical and biological properties to determine nutrient deficiencies, toxicities, and imbalances. Soil testing helps classify soils into low, medium, or high fertility categories, guiding fertilizer application rates. Balanced nutrient application improves nutrient use efficiency, prevents overuse of chemical fertilizers, and enhances soil microbial activity.

Accurate nutrient diagnosis considers several factors, including soil texture, cropping pattern, irrigation practices, and climatic conditions. In addition to macronutrients, micronutrient analysis has become increasingly important because deficiencies of zinc, boron, and iron are widespread in Indian soils. Modern

nutrient diagnosis also incorporates digital mapping, GIS tools, and decision-support systems, which improve precision and large-scale monitoring of soil fertility trends.

4. Benefits to Farmers

The Soil Health Card Scheme offers multiple economic, agronomic, and environmental benefits:

4.1 Improved Crop Productivity

By applying fertilizers according to soil requirements, farmers can achieve higher yields and better crop quality. Balanced fertilization ensures that crops receive essential nutrients in optimal proportions.

4.2 Reduced Input Costs

Scientific fertilizer recommendations prevent excessive or unnecessary fertilizer use, lowering production expenses and increasing profit margins for farmers.

4.3 Enhanced Soil Fertility and Sustainability

Regular soil testing promotes the addition of organic manures, bio-fertilizers, and soil amendments, which improve soil structure, microbial activity, and long-term fertility.

4.4 Environmental Protection

Balanced nutrient management reduces nutrient runoff, groundwater contamination, and greenhouse gas emissions associated with excessive fertilizer use.

4.5 Informed Decision-Making

Farmers gain awareness and technical knowledge regarding soil management, crop planning, and nutrient requirements, leading to more confident and evidence-based agricultural decisions.

5. Limitations of Soil Health Cards

Despite its potential, the Soil Health Card Scheme faces several operational and practical challenges:

5.1 Limited Awareness and Understanding

Many farmers receive soil health cards but lack adequate training to interpret the recommendations effectively. Illiteracy and language barriers further reduce utilization.

5.2 Sampling and Testing Delays

Delays in soil sample collection, laboratory analysis, and card distribution reduce the timeliness and relevance of recommendations.

5.3 Generalized Recommendations

In some cases, fertilizer recommendations are broad rather than crop-specific or location-specific, which limits precision in nutrient management.

5.4 Infrastructure and Resource Constraints

Insufficient soil testing laboratories, skilled personnel, and financial resources hinder large-scale implementation, particularly in remote areas.

5.5 Adoption Gap

Even when farmers receive accurate recommendations, economic limitations or traditional practices may prevent them from adopting suggested fertilizer doses or amendments.

6. Improvements and Future Prospects

To enhance the effectiveness of the Soil Health Card program, several improvements are necessary:

- **Strengthening Extension Services:** Regular farmer training, demonstration programs, and awareness campaigns can improve understanding and adoption.
- **Digital Integration:** Mobile apps, SMS advisories, and online portals can deliver real-time nutrient recommendations and reminders.
- **Increased Laboratory Capacity:** Establishing more soil testing labs and mobile testing units will reduce delays and improve coverage.
- **Precision Agriculture Tools:** Use of GIS mapping, remote sensing, and sensor-based soil diagnostics can provide highly accurate and site-specific recommendations.
- **Policy Support and Incentives:** Subsidies for organic amendments, micronutrients, and soil conditioners can encourage farmers to follow soil test-based fertilizer practices.

CONCLUSION

The Soil Health Card Scheme represents a transformative step toward scientific nutrient management in Indian agriculture. By promoting

soil testing and nutrient diagnosis, it empowers farmers to adopt balanced fertilization practices that enhance productivity, reduce costs, and protect the environment. However, its full potential can only be realized through improved awareness, better infrastructure, and integration of modern technologies. Strengthening this initiative will play a vital role in achieving sustainable agriculture, food security, and long-term soil health in the country.

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