



Soil Health Card: Importance and Use

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INTRODUCTION

Soil forms the backbone of farming activities, and the quality of the soil determines agricultural productivity, sustainability, and earnings from farming activities. Unscientific agricultural practices such as continuous cultivation, overuse of chemical fertilizers, unbalanced nutrient usage, and reduction in organic matter have resulted in degradation of soil quality in several agricultural lands. In an effort to combat this problem, the Government of India introduced the Soil Health Card (SHC) Scheme in 2015 to encourage scientifically-based nutrient management through proper soil testing. The SHC Scheme ensures that farmers are aware of the status of the nutrient content of their soil and how to manage it for proper soil management. Through the SHC Scheme, farmers are able to achieve sustainable agriculture due to increased crop yield and decreased production costs. This paper highlights the concept, objectives, significance, elements, advantages, implementation, problems, future and recommendations of the Soil Health Card Scheme.

Soils are considered one of the most precious natural resources because of their function as a growth medium for plants, providing them with the necessary nutrients, water, and physical support. Healthy soils are crucial for sustainable agriculture, food security, and environment preservation. However, due to intensive cultivation, excessive usage of chemical fertilizers, insufficient amount of organic matter, soil erosion, salinity, and nutrient mining, Indian soils are becoming less fertile and cause a drop in productivity and environmental damage.

Thus, scientific soil management becomes particularly important in order to recover soil fertility and increase agricultural productivity. To address the issue, the government of India introduced the Soil Health Card (SHC) scheme on 19 February 2015 in the Department of Agriculture and Farmers Welfare. In particular, the Soil Health Card offers farmers information on the nutrient status of soils, including crop-specific fertilizer doses and amendments. Through using the Soil Health Card, farmers are able to use balanced fertilizers, increase nutrient-use efficiency, save money on fertilizers, and adopt sustainable agricultural practices.

2. Soil Health Card Scheme

The Soil Health Card Scheme is a national-level scheme that attempts to analyze the fertility level of the soil scientifically in the laboratories and gives suggestions to farmers regarding the balanced use of nutrients. As per this scheme, soil samples are tested periodically from the fields of the farmers for different physical and chemical parameters. As per the findings, Soil Health Cards are provided to the farmers, which contain details about the nutrient level and the suggestions for the application of fertilizers and other soil amelioration measures.

Objectives

The primary objectives of the Soil Health Card Scheme include:

- ✓ Evaluation of nutrient status of the soil
- ✓ Balanced use of fertilizers
- ✓ Soil fertility and crop productivity
- ✓ Reduction in the use of chemical fertilizers
- ✓ Integrated nutrient management
- ✓ Awareness of farmers regarding soil health

3. Elements of a Soil Health Card

A Soil Health Card is an inclusive card that holds the fertility status of an individual farm. It mostly includes the name of the farmer and his identification information, location of the farm, survey number and field identification, soil type, major crops grown, laboratory results, fertilizer recommendations, soil amendments recommendation, organic manure recommendation, micronutrient status, and soil

management practices. These elements help farmers to know the status of their soil and make appropriate decisions in fertilizing and soil management.

4. Soil Elements Analyzed

The Soil Health Card analyses different physical and chemical elements of the soil that influence crops growth and productivity.

The most important elements among the major nutrients that are analyzed include Nitrogen (N), Phosphorus (P), Potassium (K), and Sulphur (S). Secondary nutrients like Calcium (Ca) and Magnesium (Mg) are also analyzed. The minor nutrients Zinc (Zn), Iron (Fe), Copper (Cu), Manganese (Mn), and Boron (B) are analyzed to detect the status of these nutrients in the soil. Moreover, different elements indicating the quality of soil are also analyzed. They include Soil pH, EC, and OC.

5. Significance of Soil Health Card

The Soil Health Card is important in encouraging sustainable agricultural practice through provision of scientific and accurate knowledge about soil fertility and nutrient requirement. The card enables the farmer to apply the fertilizers in relation to the nutrient status in the soil thus enabling proper nutrient management.

Proper fertilization of crops results in improved growth, increased efficiency in the utilization of nutrients and increased production. Excessive use of fertilizers is minimized leading to reduced cost of inputs without reducing the optimum yield. Consistent soil analysis leads to soil fertility maintenance since nutrient depletion is avoided and imbalances corrected.

The Soil Health Card encourages environmental sustainability through reduction in nutrient losses, reduced contamination of groundwater, and minimization of greenhouse gases arising from excessive fertilizer use. Incorporation of organic manure, composts, green manures, crop residues, and bio-fertilizers is encouraged. This results in improved soil organic matter content and soil

microbiology. Ultimately, the Soil Health Card ensures sustainable agriculture through maintenance of soil productivity.

The scheme also contributes to better crop quality by ensuring balanced nutrient supply throughout the crop growth period. By promoting sustainable farming practices and reducing excessive chemical fertilizer use, the Soil Health Card helps minimize environmental pollution and supports long-term agricultural sustainability. Overall, the scheme empowers farmers with scientific knowledge to make informed decisions regarding soil and crop management.

6. Procedure of Preparation of Soil Health Card

Preparation of Soil Health Card entails some systematic processes in order to carry out the correct analysis of soil fertility. The first process is selection of locations where the soil sample will be taken from according to standard scientific procedures, followed by the collection of samples of the soil from farmers' fields.

The collected soil samples are then labelled and sent to authorized soil testing labs. In the soil lab, soil samples are analyzed for several physical and chemical properties such as macro and micronutrients, soil pH, electrical conductivity, and organic carbon. This process is followed by interpreting the soil test results, which gives an expert an idea of how many fertilizers should be applied to the soil. On this basis, Soil Health Cards are developed and distributed to farmers along with advisory services and training to guide them about how to implement the suggestions.

7. Benefits for Farmers

The Scheme of Soil Health Card offers many benefits to farmers as it facilitates scientific nutrient management and rational fertilizer application. Crop specific fertilizer suggestion makes crop productivity high with low unnecessary cost of fertilizer.

- ✓ Scientific fertilizer recommendations.
- ✓ Increased crop productivity.
- ✓ Reduced fertilizer expenditure.

- ✓ Improved soil fertility.
- ✓ Better nutrient management.
- ✓ Increased farm profitability.
- ✓ Improved water-use efficiency.
- ✓ Promotion of sustainable farming.
- ✓ Better crop quality.
- ✓ Reduced environmental pollution.

8. Role in Sustainable Agriculture

The Soil Health Card Scheme plays a vital part in achieving sustainable agriculture due to its efforts for scientific soil management and proper balance of nutrients. The scheme helps in conserving soil resources, maintaining the biodiversity of soil and improving the organic content of soil. The scheme is successful in reducing the dependence on chemical fertilizers and in ensuring an integrated nutrient management with the help of chemical fertilizers, organic manure, crop residues and bio-fertilizers.

Moreover, the Soil Health Card Scheme contributes in climate smart agriculture by optimizing nutrient use, nutrient cycling, reducing greenhouse gas emissions and improving the resilience of agriculture to climatic changes. Healthier soils with increased organic content improve water retention capacity and decrease the effects of drought and soil degradation.

- ✓ Conserving soil resources.
- ✓ Maintaining soil biodiversity.
- ✓ Improving soil organic matter.
- ✓ Reducing chemical fertilizer dependency.
- ✓ Promoting integrated nutrient management.
- ✓ Supporting climate-smart agriculture.
- ✓ Improving nutrient cycling.
- ✓ Enhancing resilience to climate variability.

Challenges

Even after the successful adoption of the Soil Health Card Scheme, there are some challenges that hinder the effectiveness of this program. The first challenge is the low capacity of soil testing laboratories especially in rural and remote areas, causing a delay in the process of testing the soil samples and issuing the Soil Health Cards. There are many farmers who do not have enough knowledge regarding the need

for soil testing and scientific analysis of the soil health reports. This causes low uptake of fertilizer recommendations.

Another challenge that limits the effectiveness of the soil testing program is the shortage of trained professionals in collecting and analyzing the soil samples. It is quite challenging to collect the soil samples since they vary in terms of the soil types and farming practices. Moreover, the lack of micronutrient fertilizers makes it hard for the farmers to adopt the soil test recommendations.

10. Future Possibilities

Future possibilities for the Soil Health Card Scheme would depend on technological advancements in the field of digital agriculture and precision farming. The Digital Soil Health Cards can help farmers get soil information easily through online mediums and mobile applications. Soil sampling using GPS and Geographic Information System (GIS) technology would improve the quality of soil mapping and nutrient analysis.

Decision support system using Artificial Intelligence (AI) would provide fertilizers based on crop type and location using real-time data of soil and weather conditions. Remote sensing technology, drones, and IoT (Internet of Things) soil sensors would provide continuous monitoring of soil health and precision nutrient management. Mobile advisory services would help give recommendations to farmers. Combining the Soil Health Card Scheme with the Digital Agriculture Mission and AgriStack would improve data management. Increased emphasis on organic farming, integrated nutrient management, and climate-smart agriculture would enhance the soil health further.

11. Recommendations

In order to enhance the efficacy of the Soil Health Card Scheme, the government needs to develop the infrastructure of soil testing laboratories through the creation of additional laboratories well-equipped with modern

technology of analysis. Soil testing should be done more frequently so that the farmers can obtain up-to-date information about soil fertility and nutrients. Extensive training programs for the farmers should be conducted in order to increase their knowledge about soil test-based fertilizer recommendations.

The agricultural extension services need to actively promote the use of balanced fertilizers and integrated nutrient management practices. Soil Health Card recommendations need to be integrated with precision farming practices that include GPS, remote sensing, drones, artificial intelligence, and decision support systems in order to improve nutrient-use efficiency. The farmers need to be encouraged to use organic manures, compost, green manures, crop residues, and bio-fertilizers. Finally, the effective cooperation between research institutes, agricultural universities, extension agencies, private institutions and the farming community is critical for successful implementation of the Soil Health Card Scheme.

CONCLUSION

The Soil Health Card Scheme is one of the most important schemes in India aimed at scientific management of soils and sustainable agriculture. Being a source of information about soil fertility and nutrient needs of crops, the scheme promotes balanced use of fertilizers, enhances efficiency of nutrients utilization, increases crop productivity and reduces cost of production. In addition to an increase in farmers' incomes, the scheme is also environmentally friendly as it reduces soil degradation, loss of nutrients, and pollution of the environment. Although the scheme faces certain problems, including insufficient laboratory facilities, lack of awareness, and poor implementation of recommendations, investments in new technologies, precision agriculture, training of farmers, and supporting institutions can help further improve the scheme. The combination of the Soil Health Card Scheme and advanced technologies and

sustainable agriculture will be extremely important in ensuring the soil health, food security, and sustainable agriculture in India.

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