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Analysis of Soil Health Card awareness and Constraints among Farmers in Vidarbha Region

Ashish Homraj Lade [a++*], Sagar Nandulal Ingle [b++], Kevin Gawali [c#] and Priya Gadge [b++]

[a] Agricultural Extension Education, G H Raisoni University, Saikheda (MP), India.
[b] Soil Science and Agricultural Chemistry, G H Raisoni University, Saikheda (MP), India.
[c] School of Agricultural Sciences, GHRU, Saikheda (MP), India.

Authors' contributions

This work was carried out in collaboration among all authors. Author AHL designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript under the guidance of author SNI. Authors KG and PG managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

This study is conducted to assess the awareness levels of farmers regarding the Soil Health Card and identify the constraints they encountered in utilizing its information in the Vidarbha region of Maharashtra state. The research was conducted in Chandrapur district, specifically in the talukas of Warora, Bhadravati, Jivti, and Rajura. Three villages were selected from each taluka and ten respondents were selected from each village, resulting in a total of 120 purposively selected respondents for the study. Data collection involved personal interviews using a structured interview

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[++] Assistant Professor;
[#] Dean;
**Corresponding author: E-mail: ashishlade24@gmail.com;*

schedule. The findings revealed that slightly over half of the respondents (54.17%) had a moderate level of awareness about the Soil Health Card, while a quarter of the farmers (25.00%) had low awareness, and just over twenty per cent (20.83%) had a high level of awareness. The study also examined the distribution of respondents based on the constraints they faced and their efforts to overcome these challenges. These findings contribute to our understanding of the awareness and constraints faced by farmers in effectively utilizing the information from the Soil Health Card, highlighting the need for targeted interventions and support to improve its implementation in the region.

Keywords: Soil heath card; farmers; awareness; constraints; Maharashtra.

1. INTRODUCTION

Soil plays a crucial role in supporting various ecosystem functions, including the production of food, forestry products, and maintaining human health. Healthy soils are vital for cultivating nutritious crops that nourish both people and animals. The properties and health of the soil significantly impact agricultural productivity, food quality, environmental resilience, and the sustainability of ecosystems [1]. There is a growing recognition of the importance of soil health, as it is considered an indispensable component of the biosphere and restoring it can enhance the productivity of food-insecure farms. Furthermore, soil health has implications for global climate dynamics. Therefore, assessing and understanding the condition of soil health is crucial for the long-term sustainability and stability of agricultural ecosystems [2]. A major challenge in sustainable soil management is to balance the preservation of ecosystem services with optimizing agricultural yields. It is suggested that maintaining four key functions—carbon transformations, nutrient cycles, soil structure, and the regulation of pests and diseases—is vital for promoting soil health [3].

The excessive use of fertilizers, inadequate addition of organic matter, and neglecting to replenish depleted micro and secondary nutrients over the years have resulted in nutrient deficiencies in the soil [4]. Unfortunately, there is relatively low knowledge and adoption of Soil Fertility Management practices among farmers. To address this issue and improve the functioning of soil ecosystems, it is essential to evaluate soil health under different management systems. Accurate and systematic measurements of soil health can serve as a foundation for effective soil health management.

Since 2014-15, the Indian Government has been running Soil Health Management & Soil Health Card Schemes as part of the National Project on Soil Health & Fertility under the National Mission for Sustainable Agriculture (NMSA). These initiatives provide farmers with information about their soil's nutrient status and suggest the right amount of nutrients for better soil health and productivity. More than 23.58 crore soil health cards have been given to farmers. Now, these schemes are part of the Soil Health & Fertility component of Rashtriya Krishi Vikas Yojana (RKVY). Farmers receive guidelines on soil health regularly. Training sessions and demonstrations, totaling 93781 and 6.45 lakh respectively, are conducted based on Soil Health Card recommendations. The focus is on using chemical fertilizers, secondary and micronutrients wisely, along with organic manures & bio-fertilizers. Moreover, 7425 farmer's melas/campaigns on soil health card recommendations have been organized across the country [5].

The government of India has taken a step towards this by introducing the Soil Health Card scheme. The Soil Health Card provides farmers with essential soil health data and guidance on efficient fertilizer use for crop cultivation. It is a simple document that contains valuable information about the soil, including its nutrient availability, as well as its physical and chemical properties [6]. This initiative aims to support farmers in making informed decisions based on soil health analysis, ultimately promoting sustainable and efficient agricultural practices.

The Soil Health Card System serves as a collaborative platform that brings together various stakeholders, including the scientific community in agriculture, repositories of up-to-date tools and techniques, farmers, and the government. Its primary aim is to contribute to the overall economic upliftment of the people [7]. However, the soil testing program in India has not been able to achieve the desired impact on the farming community due to insufficient coverage and delays in providing timely fertilizer

recommendations to farmers [8]. Recognizing these challenges, this research study sought to analyze the awareness levels among farmers and identify the different constraints they face in effectively utilizing the information provided, specifically to optimize the use of recommended fertilizer doses. By understanding these factors, valuable insights can be gained to improve the implementation and effectiveness of the Soil Health Card System in supporting farmers and enhancing agricultural practices.

1.1 Specific objective of the study

- To study awareness about soil health card in utilizing its information
- To study the constraints faced by the beneficiaries of Soil Health Card

2. MATERIALS AND METHODS

2.1 Research Design

The study employed an ex-post facto research design, a systematic empirical inquiry in which the independent variables are not directly manipulated because they have already occurred or are inherently non-manipulable [9].

2.2 Sampling procedure

The present study employed the purposive random sampling method.

2.3 Selection of the District

Chandrapur district was purposively selected for research study.

2.4 Selection of Tahsils

Warora, Bhadravati, Jivti, and Rajura tahsils were purposively selected as for the further study

2.5 Selection of Villages

Three villages were selected from each taluka and ten respondents were selected from each village shown in Table 1.

2.6 Selection of Respondents

From each of the selected village, ten respondents were selected randomly comprising total sample of 120 respondents. Village wise number of selected respondents is depicted in Table-1 as follows.

2.7 Variable

2.7.1 Dependent variable

We selected a list of 36 statements related to the Awareness about soil health card based on a review of literature and informal discussions with subject experts. This list, along with their operational definitions, was sent to 30 judges for rating. The rating scale ranged from 'most relevant', ‘relevant’ and 'not relevant' with scores of 3, 2, and 1, respectively. Variables were chosen based on the mean relevancy score. Scores for each variable from the 30 judges were added and divided by the total number of judges. The average total score for all statements was calculated.

Table. 1 Village wise number of respondents selected for the study

Sr. No.	Amravati district		Selected respondents (n)
	Tahsil	Village	
1	Warora	Kavdapur	10
		Bopapur	10
		Bodakheda Yensa	10
2	Bhadravati	Chandankheda	10
		Chaprala	10
		Mursa	10
3	Jivti	Kumbhazari	10
		Yellapur	10
		Hirapur	10
4	Rajura	Pellora	10
		Mathara	10
		Sonapur	10
Total			120

2.7.2 Preparation of interview schedule

An interview schedule consist of various items concerned with the objectives of the study were developed for respondents of Soil Health Card. Necessary precautions were taken to keep language simple, so as to get desired responses from the respondents. The Interview schedule was developed in English language and then translated into Marathi for use. The schedule contained questions related to personal and socio-economical characteristics and questions related to participation by them in different farming activities.

2.7.3 Pre-testing and collection of data

The data for study were collected by personal interview of the respondents with the help of pre-tested structured interview schedule during the period from April (2023) to May (2023). In all 120 respondents were contacted at their home and work places and interviewed. Their responses were considered for the purpose of the study. Necessary help from the village level personnel was obtained.

2.8 Statistical Method Used

The collected data was coded, classified, tabulated, and analyzed to derive meaningful findings. The study employed a range of descriptive and inferential statistical methods for data analysis, as outlined below:

2.8.1 Frequency and percentage

Frequency and percentage were used for making simple comparisons. The frequency of the particular category was multiplied by hundred and divided by total number of extension personnel to get percentage.

2.8.2 Mean

The mean of the sample was calculated by adding up all individual scores and dividing by the number of items. The formula is

$$\bar{X} = \frac{\sum X}{N}$$

Where,

$\bar{X}$ = Arithmetic mean
$\sum X$ = Sum of beneficiaries score
N = Number of items

2.8.3 Standard deviation

The standard deviation is calculated by following these steps: subtracting the arithmetic mean (X) from each item in the series, squaring this difference (X^2), adding up all the squared differences (ΣX^2), dividing by the number of items (N), and finally, finding the square root of this result using the following formula.

$$S.D. = \sqrt{\frac{\Sigma X^2}{N}}$$

Where,

S.D = Standard deviation
ΣX^2 = Sum of square of the deviation from the mean
N = Total number of items

3. RESULTS AND DISCUSSION

Awareness refers to having knowledge, understanding or consciousness about a particular topic or concept. In the context of research study, it is crucial to emphasize the significance of awareness regarding soil health cards. This awareness extends beyond simply recognizing the presence of soil health cards to comprehending how to effectively interpret the information they provide. The ability to interpret the data enables informed decision-making in crucial areas such as fertilization, soil amendments, crop selection, and overall soil management practices. Moreover, it involves recognizing the potential benefits derived from implementing soil health recommendations, such as improving crop yields, reducing input costs, minimizing environmental impacts, and promoting sustainable agriculture.

Table 2 indicated that, slightly more than half (54.17%) of the respondents belong to medium awareness about Soil Health Card, one fourth farmers (25.00%) were having low awareness about Soil Health Card and slightly more than twenty per cent of farmers (20.83%) were found in high awareness about Soil Health Card, respectively.

It was concluded that slightly more than half of the respondents (54.17%) belonged to the category of medium awareness about the Soil Health Card. This indicates that a significant portion of farmers has some knowledge about the Soil Health card and its potential benefits for

soil health management. However, the study also discovered that one-fourth of farmers (25.00%) exhibited low awareness about the Soil Health Card. This highlights the need for further education and outreach efforts to ensure that all farmers have access to information about this valuable tool. On a positive note, slightly more than twenty percent of farmers (20.83%) were found to possess a high level of awareness about the Soil Health Card. This group represents a promising segment of farmers who are likely utilizing the Soil Health Card's information to make informed decisions about their soil management practices.

Overall, these findings emphasize the importance of continuous awareness campaigns to bridge the knowledge gap and promote widespread adoption of the Soil Health Card for sustainable agriculture.

These findings are similar with the findings of Sunil Kumar (2019) and Lokesh Babu (2021) [10,11].

Constraints faced by farmers in utilizing information from the Soil Health Card encompass challenges and limitations that impede their ability to effectively incorporate and apply the insights provided by the card in their agricultural practices. Table 3 revealed that the majority of farmers expressed concerns, with 85.83 per cent citing the high price of fertilizers, followed by 80.83 per cent indicating a lack of knowledge about the importance of micro-nutrients. Additionally, 78.33 per cent and 77.50 per cent of farmers noted constraints such as difficulty in calculating fertilizer doses based on the nutrient status of the soil and the distant location of soil testing laboratories.

Table 2. Awareness about soil health card in utilizing its information

Sr. No	Level of Awareness	Frequency (n)	Percentage
1	Low Awareness	30	25.00
2	Medium Awareness	65	54.17
3	High Awareness	25	20.83
	Total	120	100.00
		Mean :24.68	SD :03.79

Table 3. Constraints faced by farmers in utilising soil health card information

Sr. No	Statements	Frequency	%	Rank
1	Difficulty in calculating fertilizer dose on the basis of nutrient status of soil	94	78.33	III
2	Time gap between soil samples taken & issuing Soil Health Cards was too high	78	65.00	VIII
3	Collection of soil sample was not done in presence of farmer	45	37.50	XV
4	Inability to understand all the information given in the Soil Health Card	79	65.83	VII
5	High price of fertilizers	103	85.83	I
6	Lack of knowledge about method of collecting ideal soil sample	86	71.66	V
7	Soil testing laboratories are located far away	93	77.50	IV
8	Result of soil testing is not reliable	37	30.83	XVI
9	Recommended fertilizers not available in adequate quantity in the local market	81	67.50	VI
10	Lack of technical advice on method and time of fertilizers application	78	65.00	IX
11	Recommendation of Soil Health Card is not creditable	58	48.33	XII
12	Lack of knowledge regarding advantages of Soil Health Card	63	52.50	XI
13	Unavailability of Micro-Nutrient in Market	49	40.83	XIV
14	Lack of education among farmers	51	42.50	XIII
15	Lack of support of family members	65	54.16	X
16	Lack of Knowledge about important of micro-nutrients	97	80.83	II

More than two-thirds (71.66%) of farmers indicated a lack of knowledge about the method of collecting ideal soil samples, followed by 67.50 percent expressing concerns about the unavailability of recommended fertilizers in adequate quantities in the local market. Furthermore, 65.83 per cent and 65 per cent of farmers revealed constraints related to the extended time gap between soil samples taken and the issuance of cards. Other highlighted constraints include a lack of technical advice on fertilizer application methods and timing (65.00%), insufficient support from family members (54.16%), limited knowledge about the advantages of Soil Health Cards (52.50%), skepticism regarding the credibility of SHC recommendations (48.33%), low education levels among farmers (42.52%), unavailability of micro-nutrients in the market (40.83%), soil sample collection not being done in the presence of the farmer (37.50%), and concerns about the reliability of soil testing results (30.83%).

These findings are similar with the findings of Sunil Kumar [11] and Sheetal [12].

Addressing these constraints necessitates a multifaceted approach that includes awareness programs, capacity building initiatives, improved access to technology, financial support, and tailored extension services. By overcoming these challenges, farmers can harness the full potential of the Soil Health Card's information to enhance soil health, optimize resource utilization, and foster sustainable agricultural practices.

4. SUMMARY AND CONCLUSION

The study reveals that 54.17 percent of farmers have a moderate awareness of the Soil Health Card, while 25.00 per cent have low awareness, and 20.83 per cent exhibit high awareness. Farmers face challenges such as the high cost of fertilizers (85.83%), lack of knowledge about micro-nutrients (80.83%), and difficulties accessing soil testing services due to distant laboratories. Other constraints include issues with collecting ideal soil samples, unavailability of recommended fertilizers, and concerns about the time gap between taking samples and receiving the Soil Health Card. Addressing these challenges is crucial for the program's success. In conclusion, interventions such as educational initiatives, improved fertilizer accessibility, and enhanced awareness campaigns are essential to overcome these challenges and promote sustainable agricultural practices among farmers.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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