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FARMERS AWARENESS OF SOIL TESTING AND USEFULNESS OF THE SOIL HEALTH CARD

Raushan Kumar[1*], Arpita Sharma Kandpal[2] and Anil Kumar[1]
[1]Department of Soil Science, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar - 263145 (U.S. Nagar, Uttarakhand), India
[2]Department of Agricultural Communication, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar - 263145 (U.S. Nagar, Uttarakhand), India
[*]Corresponding author E-mail: raushankumar2778@gmail.com
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ABSTRACT

Soil health is a critical determinant of agricultural sustainability and productivity. Recognizing the significance of balanced nutrient management, the present study was conducted at the 117th Kisan Mela, G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, to assess farmers' knowledge regarding soil testing and the utility perception of the Soil Health Card (SHC). A total of 50 farmers were selected for investigation and interviewed using a structured schedule. The findings revealed that while a significant proportion of farmers exhibited moderate to high knowledge about Soil Testing and the Soil Health Card, notable gaps persisted. Most respondents were middle-aged (56%), had moderate farming experience (48%), and primarily practiced conventional agriculture with a high dependency on chemical fertilizers (74%). Although a substantial number (78%) acknowledged the benefits of soil testing and Soil Health Card, a considerable fraction (22%) remained unaware or underutilized these tools. The study highlighted the urgent need for targeted education and awareness programs to enhance farmers' understanding of sustainable soil management practices. Strengthening farmer-scientist communication and promoting the effective use of soil testing services can contribute significantly to achieving soil conservation goals and ensuring sustainable agricultural development.
Keywords **:** Farmers, Awareness, Usefulness, Soil Testing, Soil Health Card.

Introduction

Soil is one of the fundamental components of farming, as it serves as a reservoir of nutrients essential for the growth and development of crops. Healthy soil contains an adequate balance of macro and micronutrients, which collectively determine soil health. When soil lacks one or more of these essential nutrients, it can result in reduced crop yield or degraded crop quality (Lal, 2015). Thus, maintaining the proper proportion and quantity of nutrients in the soil is crucial for optimal crop performance. Soil health plays a vital role in ensuring sustainable agricultural production. It enables the efficient utilization of fertilizers while minimizing wastage. However, many farmers continue to apply increasing amounts of chemical fertilizers to boost crop yields without assessing the fertility status of their soil (Srivastava and Pandey, 1999). This practice not only leads to nutrient imbalances but can also accelerate the degradation of soil quality over time. Soil conservation is critical as it underpins life on Earth. The United Nations' 2030 Sustainable Development Goals (SDGs)-including zero hunger, good health and well-being, climate action, and life on land-are all deeply interconnected with healthy soils and sustainable agricultural systems. In addition to supporting food production, healthy soils provide numerous ecosystem services, such as serving as habitats for wildlife and

improving water quality through effective infiltration management. Despite their importance, one-third of the world's soils are currently degraded (FAO, 2022). Soil testing is widely recognized as a reliable scientific tool for evaluating the soil's capacity to supply nutrients to crops. Its benefits have been demonstrated through extensive research, field demonstrations, and farmer-based fertilizer recommendations. According to (Patel *et al.,* 2017), soil testing remains the most accessible and essential method for assessing nutrient levels in soils.

In scientific research, defining objectives and testing hypotheses often requires simplifying complex relationships, especially when providing management recommendations based on cause-and-effect relationships. Therefore, effective communication between scientists and farmers is crucial. Recommendations should be context-specific, tailored to local soil and environmental conditions, and clearly explained to farmers to ensure proper implementation (Bechini *et al.,* 2020; Bijttebier *et al.,* 2018; Hijbeek *et al.,* 2019). As key stakeholders in food production, farmers must be actively involved in achieving sustainability goals through informed soil management practices.

Thus, keeping above in mind, present research investigation was designed with the following objectives: 1-To study socio-economic characteristics of the respondents. 2-To assess the knowledge of farmers regarding Soil testing. 3-To study the perceived utility of Soil Health cards.

Materials and Methods

The current study was carried out at G. B. Pant University of Agriculture and Technology (GBPUA&T) 117th kisan mela in Pantnagar, Uttarakhand. The university holds Kisan Mela twice a year. This information was gathered during the Kisan mela for the Farmers' Awareness of Soil Testing and Usefulness of the Soil Health Card. Total 50 respondents were selected for present research investigation. A structured interview schedule was employed to collect information from farmers. A well-structured interview schedule was created with the study's specific objectives in mind. The investigator conducted personal interviews with the respondents, which allowed him to obtain firsthand information and witness them in person. The data were tabulated and analyzed with the objectives to assess the knowledge of Soil Testing technology and perception to use Soil Health Cards (SHC) for advance farming.

Results and Discussion

Demographic Characteristics of Respondents

Gender: The socio-economic characteristics of the surveyed farmers (n = 50) are summarized in Table 1. The majority of the respondents were male (78%), while female respondents accounted for 22%, indicating a male-dominated participation in farming activities.

Age: In terms of age distribution, 56% of the farmers were from the middle age group (30–50 years), followed by 26% in the older age group (above 50 years), and only 18% were young farmers (up to 30 years), suggesting that farming is primarily managed by middle-aged individuals. Studies like Chaudhary *et al.* (2019) have found that middle-aged farmers are more inclined to embrace new agricultural advances because of their expertise and physical capabilities, which supports this trend.

Landholding: Regarding landholding size, most farmers (52%) belonged to the small category (above 1 to 2 hectares), followed by marginal farmers (30%), and large farmers (18%). Notably, no landless farmers were found in the sample. According to Thakur and Jena (2020), moderate levels of experience (5–15 years) correlate with higher entrepreneurial initiative, including exploring product diversification and partnerships.

Annual income: Annual income levels showed that nearly half (48%) of the respondents had a high income (above Rs.1,00,000), while 32% fell into the medium income group, and 20% belonged to the low-income category.

Family size: The family size of most respondents was large (>5 members), comprising 64%, while 36% had small families (≤5 members). The majority (64%) had large families (more than 5 members), which could be both a support and a challenge. While it may provide labour for farming, it also increases the burden on household resources and income requirements. A larger family size was observed in 64% of cases, indicating potential availability of family labour, which remains a critical resource in traditional farming systems. However, larger families also imply greater dependency burdens.

Occupation: In terms of occupation, a significant portion of respondents (64%) were engaged in agriculture along with livestock farming, 22% were involved in only agriculture, and 14% combined agriculture, livestock farming and business/service, highlighting the trend of income diversification among rural households.

Table 1 : Demographic Characteristics of Respondents.

N=50

S. No.	Characteristic	Category	Number of Farmers Frequency	% Distribution
1.	Gender	Male	39	78.00
		Female	11	22.00
2.	Age	Young (Up to 30 year)	09	18.00
		Middle (30 to 50 year)	28	56.00
		Old (Above 50 year)	13	26.00
3.	Land holding	Landless	0	0.00
		Marginal (Up to 1 ha.)	15	30.00
		Small (Above 1 to 2 ha.)	26	52.00
		Large (Above 2 ha.)	09	18.00
4.	Annual income	Low (Up to Rs.50,000)	10	20.00
		Medium (Rs.50,000 to Rs.1,00,000)	16	32.00
		High (> Rs.1,00,000)	24	48.00
5.	Size of family	Small (Up to 5 member)	18	36.00
		Large (> 5 member)	32	64.00
6.	Occupation	Only Agriculture	11	22.00
		Agriculture with Live stock Farming	32	64.00
		Agriculture with Livestock farming and Business/Service	07	14.00

Demographic characteristics of the respondents according to personal profile

Education: The majority of farmers have received formal education, with 30% having completed higher secondary and 20% being graduates or above. Additionally, 26% had secondary education, and 18% had only primary education, while 6% were illiterate Table 2. This reflects a reasonably educated farming community, which can positively impact their ability to adopt modern farming practices, access information, and make informed decisions. However, continued efforts in adult education and agricultural training are essential, especially for those with lower educational levels (Kumar *et al*., 2018).

Experience: Almost half (48%) of the farmers had medium-level experience (10-25 years), suggesting a well-established base of practical knowledge. A significant 34% had high experience (more than 25 years), while only 18% were relatively new to farming. These findings imply that the majority of the respondents are seasoned farmers who likely rely on traditional practices but may also be open to innovation with proper support. This level of experience suggests a moderate familiarity with value addition, which may influence perceptions and willingness to expand or adopt new technologies. This aligns with Verma and Singh (2020) who highlighted that experience plays a crucial role in decision-making and innovation adoption among smallholder farmers.

Finance: The majority shows that 46% of the farmers relied on government or bank financing, making it the most common source of financial support. However, a significant 30% of farmers had no access to finance, which may limit their ability to invest in quality inputs or improve farm operations. Private sector financing was used by only 8%, while 16% depended on co-operative institutions. These findings suggest the need to expand financial inclusion, particularly by improving awareness, accessibility, and trust in institutional credit systems to reduce reliance on informal or no finance sources.

Resources: The majority of farmers 54% had low resources, indicating limited access to agricultural tools, inputs, or financial support. About 34% fell into the medium resource category, while only 12% had high resources. This suggests a clear disparity in

resource distribution, which can affect productivity and the ability to adopt modern farming methods. The findings highlight the need for targeted support and resource allocation, especially for low-resource farmers, to improve agricultural outcomes and livelihoods.

Type of Agriculture: Conventional farming was dominant among the respondents, with 72% practicing traditional agricultural methods. Only 28% were engaged in non-conventional practices, which include organic or innovative farming techniques. This shows that while awareness or interest in alternative farming exists, widespread adoption remains limited.

Use of Fertilizer: Chemical fertilizer usage was highest (74%), indicating dependency on conventional inputs. Only 4% used organic fertilizers exclusively, while 22% used a mix of both. This reflects a trend toward chemical dependency, which may have implications for soil health and sustainability. However, the presence of farmers using mixed fertilizers suggests an emerging interest in more sustainable practices. In terms of fertilizer use, a significant preference (74%) for chemical fertilizers was recorded, with only a small fraction (4%) depending solely on organic inputs. This pattern reflects the continuing reliance on chemical-based intensive agriculture, possibly driven by immediate yield benefits, as previously discussed by Choudhary and Jat (2019).

Table 2 : Demographic characteristics of the respondents according to personal profile.

n=50

S. No	Characteristic	Category	Number of Farmers Frequency	% Distribution
1.	**Education**	Illiterate	03	6.00
		Primary (1 to 8th Std)	09	18.00
		Secondary (9th to 10th)	13	26.00
		Higher Secondary (11th to 12th)	15	30.00
		Graduate and above	10	20.00
2.	**Farming Experience**	Low (Up to 10 years)	09	18.00
		Medium (10 to 25 years)	24	48.00
		High (> 25 years)	17	34.00
3.	**Source of Finance**	No Finance	15	30.00
		Private Sector	04	08.00
		Govt. Sector/ Bank	23	46.00
		Co- operative Sector	08	16.00
4.	**Resources of Farmer**	Low (0-25)	27	54.00
		Medium (26-50)	17	34.00
		High (above 50)	06	12.00
5.	**Type of agriculture**	Conventional	36	72.00
		Non-conventional	14	28.00
6.	**Use of Fertilizer**	Organic Fertilizer Only	02	04.00
		Chemical Fertilizer Only	37	74.00
		Mixed (Organic + Chemical)	11	22.00

Knowledge on the Benefits of Soil Testing

The data on farmers' knowledge of the benefits of soil testing reveals varied levels of awareness. A substantial portion of farmers, 36%, possess a high level of knowledge, and 18% report a very high level of understanding (Table 3 and Fig 1). This indicates that nearly half of the respondents are well-informed about how soil testing can enhance soil health and improve agricultural productivity. However, there is also a notable segment of farmers with limited knowledge on the subject. Specifically, 24% of farmers had a medium level of knowledge, while 14% reported a low level of awareness, and 8% had a very low understanding of soil testing benefits. These figures suggest that while many farmers are familiar with soil testing, a significant proportion may not fully

comprehend its potential benefits, which can hinder its widespread adoption. The results highlight the need for more targeted outreach programs to educate farmers, particularly those with lower levels of awareness. Extension services and training workshops can play a crucial role in improving farmers' understanding of soil testing and its advantages, such as better nutrient management, increased crop yield, and more sustainable farming practices. Furthermore, simplifying the process of soil testing and making it more accessible could encourage greater participation from those with limited knowledge (Sahrawat and Meena, 2018). Farmers with higher knowledge can make informed decisions regarding their soil management practices, which can lead to more sustainable farming (Singh and Gupta, 2017). However, the low knowledge levels among some farmers emphasize the need for enhanced educational programs to raise awareness of the importance of soil testing (Ghosh and Meena, 2020).

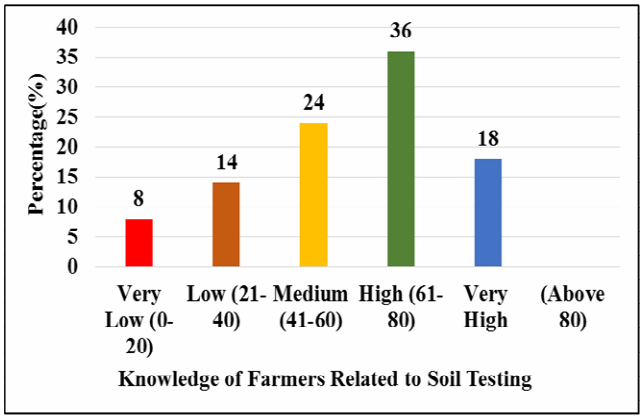

Fig. 1: Knowledge on the Benefits of Soil Testing.

Table 3: Knowledge regarding benefits of soil testing.

n=50

S. No.	Characteristic	Category	Number of Farmers	% Distribution
1.	**Knowledge on the Benefits of Soil Testing**	Very Low (0-20)	04	08.00
		Low (21-40)	07	14.00
		Medium (41-60)	12	24.00
		High (61-80)	18	36.00
		Very High (Above 80)	09	18.00

Perceived Utility of the Soil Health Card

The majority of farmers have a positive perception of the Soil Health Card (SHC) scheme. Specifically, 36% of the respondents rated its utility as high, and 18% considered it very high, indicating a strong appreciation for the role of the SHC in improving soil management and crop productivity. Additionally, 24% of farmers had a medium level of perception, showing moderate understanding and acceptance (Table 4 and Fig. 2). On the other hand, a smaller percentage of farmers viewed the utility of the SHC less favourably, with 14% rating it as low and 8% as very low. This suggests that while the majority see value in the SHC, there is still a segment of the farming population that may not fully understand its benefits or may face barriers in its practical use. These findings emphasize the importance of continued awareness campaigns and farmer training programs to improve understanding and utilization of the SHC. Increased efforts in field-level demonstrations, personalized guidance, and easier access to soil testing services could help bridge the perception gap and ensure that more farmers can effectively use the SHC for better soil and crop management (Narayanan and Singh, 2021). As noted by Singh and Gupta (2017), the card helps farmers optimize the use of fertilizers and improve soil quality, but its utility may be undermined if farmers do not perceive it as highly valuable or do not have adequate knowledge of how to use it effectively. Therefore, increasing the adoption and understanding of this tool through awareness campaigns could further enhance its utility.

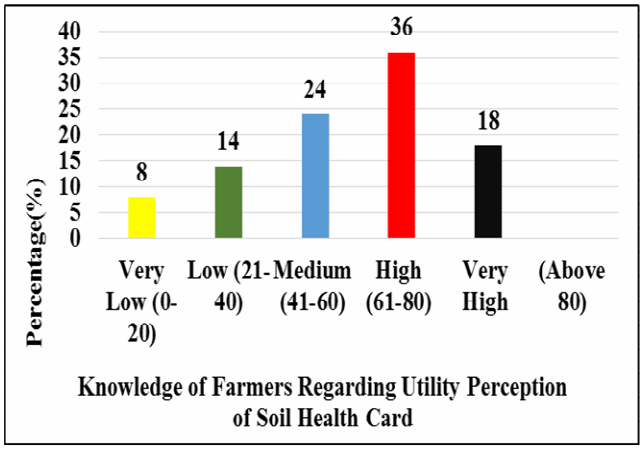

Fig. 2: Knowledge regarding utility perception of soil health Card (SHC).

Table 4: Knowledge regarding utility perception of soil health Card (SHC).

				n=50
S. No.	**Characteristic**	**Category**	**Number of Farmers**	**% Distribution**
1.	**Perceived Utility of the Soil Health Card**	Very Low (0-20)	04	**08.00**
		Low (21-40)	07	**14.00**
		Medium (41-60)	12	**24.00**
		High (61-80)	18	**36.00**
		Very High (Above 80)	09	**18.00**

Conclusion

Thus, it can be concluded that the critical role of soil testing and the Soil Health Card in promoting sustainable soil fertility management among farmers. Despite a reasonable level of awareness and positive perception among a majority of respondents, there remains a substantial portion of farmers with limited knowledge and low utilization rates. The dominance of conventional farming practices and a high reliance on chemical fertilizers suggest an urgent need to promote integrated nutrient management approaches. Enhancing farmer education through targeted awareness programs, capacity-building initiatives, and continuous engagement with extension services can bridge existing knowledge gaps. Empowering farmers with scientific soil management practices will not only improve crop productivity and soil health but also contribute to achieving broader goals of sustainable agriculture and rural prosperity. Collaborative efforts between policymakers, extension agents, and farmers are essential to maximize the potential benefits of soil testing and ensure the long-term conservation of this vital natural resource.

References

Bechini, L., Costamagna, C., Zavattaro, L., Grignani, C., Bijttebier, J., and Ruysschaert, G. (2020). Drivers and barriers to adopt best management practices. Survey among Italian dairy farmers. Journal of Cleaner Production, **245**, 118825.

Bijttebier, J., Ruysschaert, G., Hijbeek, R., Werner, M., Pronk, A. A., Zavattaro, L., Bechini, L., Grignani, C., ten Berge, H., Marchand, F., and Wauters, E. (2018). Adoption of non-inversion tillage across Europe: Use of a behavioural approach in understanding decision making of farmers. Land Use Policy, **78,** 460–471.

Choudhary, M. L., Patel, N. L., and Shah, S. K. (2019). Value addition and its role in income generation and rural development. Journal of Agricultural Economics, **74(3),** 458–466.

Choudhary, M., and Jat, M. L. (2019). Managing nutrient use in Indian agriculture: Need for a balanced approach. *Current Science*, **117(5),** 772-781.

FAO. (2022). Global soil partnership 2012–2022 **–** Sustainable soil management in action. Rome. https://doi.org/ 10. 4060/cc0921en

Ghosh, P. K., and Meena, R. K. (2020). Impact of soil testing and balanced fertilization on soil health and crop productivity in India. Indian Journal of Fertilizers, **16(1),** 46-52.

Hijbeek, R., Pronk, A. A., van Ittersum, M. K., Verhagen, A., Ruysschaert, G., Bijttebier, J., Zavattaro, L., Bechini, L., Schlatter, N., and ten Berge, H. F. M. (2019). Use of organic inputs by arable farmers in six agroecological zones across Europe: Drivers and barriers. Agriculture, Ecosystems & Environment, **275,** 42–53.

Kumar, S., Meena, B. S., and Singh, R. (2018). Role of education in adoption of agricultural innovations: A review. *Agricultural Reviews*, **39(2),** 141-146.

Lal, R. (2015**).** Restoring soil quality to mitigate soil degradation. *Sustainability*, ***7*(5),** 5875-5895.

Narayanan, S., and Singh, S. (2021). *Role of soil health cards in improving soil fertility management among farmers in India.* Agricultural Economics Research Review, **34(1),** 45-54.

Patel, G. G., Lakum, Y. C., Mishra, A., and Bhatt, J. H. (2017**).** Awareness and knowledge regarding soil testing and utility perception of soil health card. *International Journal of Current Microbiology and Applied Sciences*, ***6*(10),** 329-334.

Sahrawat, K.L., and Meena, S. (2018). *Effectiveness of soil health management in Indian agriculture: A review. Soil & Tillage Research*, **180,** 81-93.

Singh, A., and Gupta, P. K. (2017). Soil Health Card Scheme: A tool for improving farm productivity. *International Journal of Agriculture Sciences*, **9(10),** 5049-5051.

Srivastava, Y. C., and Pandey, A. P. (1999). Knowledge and attitude of small and marginal farmers towards soil testing. *Agricultural Extension Review*. **11(6):** 3-6.

Thakur, S., and Jena, M. (2020). Experience and innovation uptake in rural agribusiness. *Journal of Extension Studies*, **7(3),** 56–63.

Verma, A., and Singh, D. (2020). Experience as a determinant of innovation adoption in agriculture. *Agrarian Research Review*, **38(3),** 98–105