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Perception, feasibility, and adoption of soil health card based recommendations for sustainable nutrient management in Northern Telangana

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Abstract

The Soil Health Card (SHC) scheme was initiated by the Government of India to promote balanced fertilizer usage and sustainable soil fertility management. The present study was conducted in ten purposively selected districts of Northern Telangana zone with a sample size of 360 farmers to assess their perception, feasibility, usage, and constraints regarding SHC-based recommendations. Results indicated that 39% of the respondents perceived SHC recommendations as favorable, while 35% rated them as most favorable. Regarding feasibility, 42% of farmers perceived SHC as moderately feasible. However, adoption remained low, with 57% reporting low usage of recommendations. Garrett ranking analysis revealed that the major constraints were lack of pre-seasonal training (Rank I), difficulty in understanding SHC information and calculating fertilizer doses (Rank II), and fear of reduced yields or lack of faith in results (Rank III). The study highlights the need for pre-seasonal training, timely distribution of SHCs, and provision of input subsidies to enhance adoption.

Keywords: Soil health card, perception, feasibility, usage, constraints, Northern Telangana

Introduction

Soil fertility management is a crucial factor in sustaining agricultural productivity. Excessive and imbalanced use of fertilizers has led to nutrient mining, declining soil health, and reduced crop productivity in India (Chaudhari, 2016) ^[3]. To address this, the Government of India launched the Soil Health Card (SHC) scheme in 2015 to provide farmers with soil test-based recommendations for judicious fertilizer application. The SHC aims to improve awareness on soil health, promote balanced fertilization, and reduce cultivation cost. Despite these objectives, the adoption of SHC-based recommendations has been uneven across regions. Several studies indicate gaps between awareness and actual usage, often due to literacy barriers, complexity of recommendations, and limited technical support (Kumar *et al.*, 2017; Patel & Sharma, 2019) ^[4, 9]. Therefore, an in-depth analysis of farmers' perception, feasibility, and constraints is necessary for refining extension strategies.

The present study was undertaken in Northern Telangana Zone to assess the perception, feasibility, and utilization of SHC-based recommendations and to analyze constraints faced by farmers. Chaudhari (2016) ^[3] reported that soil fertility deterioration is primarily due to imbalanced fertilizer use, emerging micronutrient deficiencies, and faulty irrigation management. Kumar *et al.* (2017) ^[4] highlighted that farmers' awareness about SHC is relatively high, but usage remains low due to difficulties in interpreting recommendations. Patel and Sharma (2019) ^[9] found that timely distribution of SHCs and field demonstrations significantly increased adoption among smallholders. Singh *et al.* (2020) ^[15] emphasized that technical guidance and subsidies are key enablers for scaling up SHC-based nutrient management practices. Sure! Here's a concise paragraph-wise summary of the studies you listed, with each author and their key findings separated for clarity. Ankhila, R. H., *et al.* (2023) ^[1] in the study in Andhra Pradesh involving 120 SHC adopters and 60 non-adopters revealed that adoption of the Soil Health Card scheme improved farmers' awareness about soil health and increased agricultural productivity.

Charel, J. M., *et al.* (2018) ^[2] revealed that among SHC holders, 70.83% exhibited a moderate level of perception of the scheme, highlighting the need for better awareness programs and training to improve adoption rates. Reddy, A. A. (2017) ^[10] found that this study emphasized the importance of farmer education, showing that understanding the SHC process and recommendations is crucial for maximizing the scheme's benefits. Sahay, R., *et al.* (2019) ^[11] concluded that Research in Unnao District demonstrated that SHC adoption led to judicious fertilizer use, increased use of bio-fertilizers, and overall improvement in soil health, supporting sustainable farming practices. Singh, B. P., *et al.* (2023) ^[14] revealed that the Farmers who adopted SHC recommendations achieved significant yield increases in wheat (30.80%), paddy (29.80%), and sugarcane (32.90%), showing the scheme's effectiveness in enhancing soil fertility and crop productivity. Ohlan, R., *et al.* (2025) ^[7] reported in the study in Haryana identified challenges such as inadequate extension services and low awareness, suggesting targeted interventions are needed to boost SHC adoption. Madhuri, C. R., *et al.* (2024) ^[6] revealed that Paddy growers in north coastal Andhra Pradesh expressed skepticism about the immediate benefits of SHC recommendations, indicating the necessity of demonstration trials and farmer training programs. Yadav, S. (2025) ^[18] reported that Farmers in Rewari District faced difficulties interpreting SHC recommendations and calculating fertilizer doses, which hindered full adoption despite adequate knowledge of the scheme. Kumar, D. V., & Rani, A. J. (2018) ^[5] found that adoption of SHC recommendations among paddy farmers was positively influenced by factors such as age, education, and extension contact. Patel, D. K., *et al.* (2021) ^[8] revealed that in Saharsa district, SHC promoted balanced fertilizer use and improved soil health, with adoption significantly influenced by socio-economic factors. Sivanarayana, G. (2023) ^[16] in the study highlighted that access to information, training, and extension services were key determinants of SHC adoption, emphasizing the need for supportive policies. Sahu, V. P. (2023) ^[12] showed that Wheat growers in Jabalpur who followed SHC recommendations experienced higher productivity and lower input costs, illustrating the scheme's potential for enhancing farm profitability. Sunil, B. H., & Kumar, S. (2012) ^[17] revealed that farmers in Bilaspur had a generally positive perception of SHC, but challenges in understanding technical recommendations and accessing inputs limited adoption. Shrivastava, R., *et al.* (2009) ^[13] reported that Socio-economic traits such as education,

income, and landholding size significantly influenced the adoption of disease control measures in rice, which parallels the adoption patterns observed for SHC recommendations.

Objectives

1. To study the perception of farmers towards SHC-based recommendations.
2. To assess the feasibility and usage of SHC-based recommendations.
3. To analyze constraints faced by farmers in adopting SHC-based recommendations.

Methodology

The study was conducted in ten purposively selected districts of the Northern Telangana Zone, namely Adilabad, Karimnagar, Siricilla, Nizamabad, Peddapally, Mancherial, Kamareddy, Asifabad, Nirmal, and Jagtial, chosen for their significance in paddy cultivation and agricultural activities. A total of 400 farmers were selected as respondents, with 40 individuals from each district to ensure adequate representation of the farming population. Data were collected through a pre-tested structured interview schedule, designed to capture detailed information on farmers' perceptions, feasibility, and utilization of soil health cards, as well as the constraints encountered in paddy seed production. The pre-testing of the interview schedule ensured that the questions were clear, relevant, and reliable. The collected data were analyzed using descriptive statistical tools, including frequency and percentage, to summarize demographic characteristics and response patterns, and ranking methods to assess the relative importance of different responses. Further, the constraints faced by farmers were quantitatively evaluated and prioritized using the Garrett ranking technique, which converts ranks into scores for objective assessment. This methodological approach provided a comprehensive understanding of the technological and skill gaps in paddy seed production among farmers in the selected districts.

Perception of Soil Health Card Recommendations

Pooled data of Northern Telangana revealed that 39% of farmers perceived SHC recommendations as favorable, followed by 35% who rated them as most favorable, and 26% as less favorable. District-wise, Kamareddy (50%) and Nizamabad (40%) showed higher positive perceptions, while Asifabad recorded 50% less favorable responses.

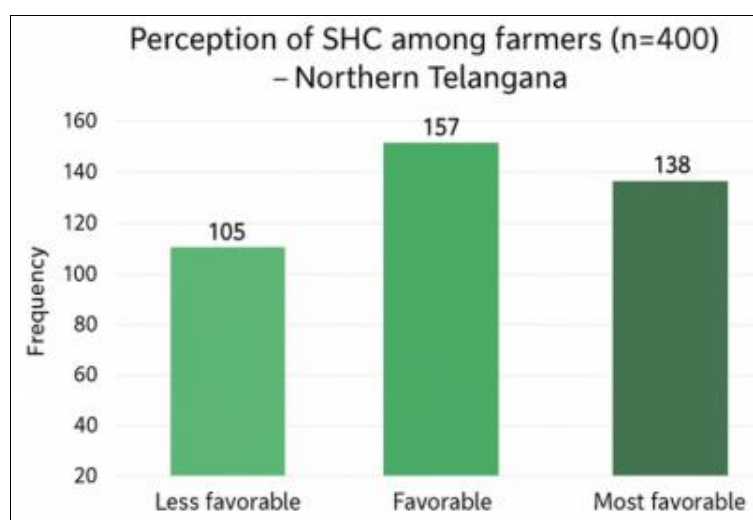


Fig 1: Distribution of Respondents according to the Perception of Soil Health Card Recommendations

Fig no.1 indicating Perception of SHC by the respondents reveals that the majority of respondents (39%) reported a favorable perception of SHC, indicating that they generally acknowledge the usefulness of these cards in improving soil fertility and crop management. A slightly smaller portion (35%) showed a most favorable perception, reflecting strong confidence and trust in SHC recommendations. Only 26% of respondents expressed a less favorable perception, which may indicate skepticism or lack of complete understanding of the

benefits of SHC. Overall, the positive perception among farmers suggests a reasonable level of awareness and acceptance of SHC technology.

Feasibility of SHC Recommendations

A majority (42%) of farmers found SHC recommendations moderately feasible, while 36% rated them as low feasibility, and only 22% considered them highly feasible. Asifabad had the highest proportion of farmers reporting low feasibility (67.5%).

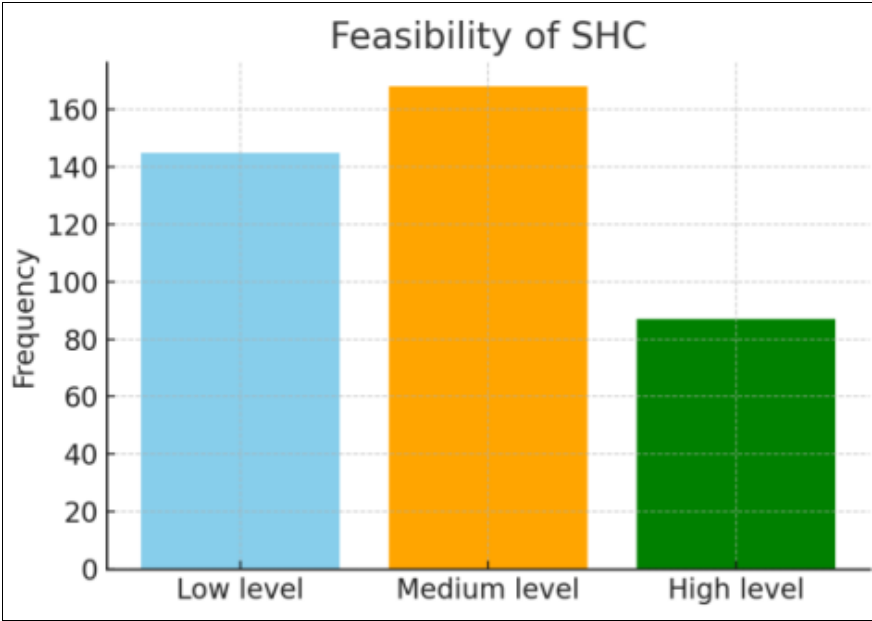


Fig 2: Distribution of Respondents according to the Feasibility of Soil Health Card Recommendations

Fig no. 2 on Feasibility of SHC peceieved by the respondents shows that when examining the practical feasibility of using SHC recommendations, 42% of respondents reported a medium level of feasibility, suggesting that most farmers find it moderately easy to implement SHC recommendations in their fields. About 36% perceived a low level of feasibility, indicating certain challenges such as lack of resources, technical knowledge, or timely access to inputs recommended in the SHC. Only 22% reported a high level of feasibility, which implies that a minority of farmers can easily adopt all SHC recommendations

without constraints. This indicates that while SHC is generally considered useful, practical barriers still affect its full adoption.

Usage of SHC Recommendations

Adoption of SHC recommendations remained low with 57% of respondents under the low usage/non-adoptioncategory, 29% under medium usage, and only 14% under high usage. Districts such as Peddapally, Siricilla, and Mancherial had more than 60% farmers reporting low adoption levels.

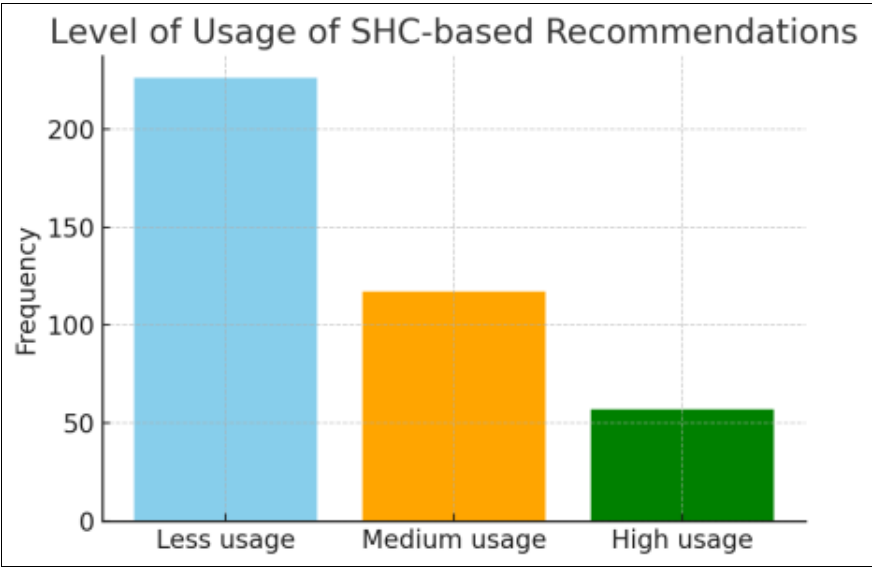


Fig 3: Distribution of Respondents according to the usage of Soil Health Card Recommendations

Fig no. 3 indicating the level of usage based on SHC recommendations explains that despite the generally positive perception and moderate feasibility, the actual usage of SHC-based recommendations remains low. Over half of the respondents (57%) reported less usage or non-adoption, while 29% reported medium usage, and only 14% were highly

compliant with the recommendations. This gap between perception and practice highlights that awareness and acceptance alone are insufficient for full adoption. Factors such as lack of training, difficulty in understanding technical recommendations, limited availability of inputs, or hesitation due to fear of reduced yields could be influencing this low adoption rate.

Table 1: Data of Respondents of Northern Telangana zone in district wise based in their level of perception, feasibility and usage of Soil Health Card Recommendations, Northern Telangana Zone - Soil Health Card Findings (10 Districts)

S. No	District	Perception (Favorable/ Most Favorable %)	Feasibility (Medium/High)	Low Usage (%)	Top Constraints
1	Adilabad	45 / 30	42 / 28	67.5	Lack of awareness (52.5%), Low literacy (40%)
2	Karimnagar	37.5 / 35	45 / 15	60	Non-awareness of deficiency (70%), Difficulty applying fertilizers (65%)
3	Siricilla	47.5 / 25	50 / 20	52.5	Lack of guidance (55%), Non-awareness of sampling (45%)
4	Nizamabad	35 / 40	45 / 27.5	57	Difficulty applying fertilizers (72.5%), Non-awareness of deficiency (67.5%)
5	Peddapally	42.5 / 30	35 / 25	65	Difficulty applying fertilizers (72.5%), Non-awareness of sampling (52.5%)
6	Mancherial	50 / 35	56 / 20	67	Difficulty applying fertilizers (60%), Non-awareness of sampling (35%)
7	Kamareddy	32.5 / 50	47.5 / 22.5	55	Difficulty applying fertilizers (67.5%), Fear of reduced yields (37.5%)
8	Asifabad	17.5 / 32.5	67.5 / 17.5	40	Difficulty applying fertilizers (70%), Lack of subsidy (40%)
9	Nirmal	45 / 35	43 / 17	45	Difficulty applying fertilizers (52.5%), Lack of subsidy (40%)
10	Jagtial	68 / 20	41 / 27	31	Lack of understanding of SHC results (61%), Delay in distribution (58%)

Table 2: Pooled data of Respondents of Northern Telangana zone based in their level of perception, feasibility and usage of Soil Health Card Recommendations n=400

S. No	Dependent variables	Response	Class interval	Frequency (n)	Percentage (%)	Rank
1	Perception of SHC	Less favorable	56-69	105	26	III
		Favorable	69-82	157	39	I
		Most favorable	82-95	138	35	II
2	Feasibility of SHC	Low level	86-93	145	36	II
		Medium level	93-100	168	42	I
		High level	100-107	87	22	III
3	Level of usage of SHC based recommendations	Less usage/Non adoption	17-21	226	57	I
		Medium usage	21-25	117	29	II
		High usage	25-29	57	14	III

Table no. 2 indicated the analysis of respondents from the Northern Telangana zone regarding Soil Health Cards (SHC) reveals distinct patterns in perception, feasibility, and actual usage. In summary, while farmers in the Northern Telangana zone have a mostly favorable perception of SHC and find it moderately feasible, the actual usage of SHC-based

recommendations is limited. This indicates the need for targeted interventions such as training, simplified guidance, timely input availability, and localized extension support to improve the practical adoption of SHC recommendations.

Constraints in Adoption

Table 3: Garrett ranking analysis for identifying major constraints faced by respondents in adoption of Soil health card based recommendations n=400

S. No.	Constraints	1	2	3	4	5	6	7	8	Total Respondents	Total Score	Total Mean	Rank
1	Lack of pre seasonal training to farmers on usage of soil health cards (SHC)	127	223	48	0	0	0	0	0	400	28070	70.1	I
2	Delay in receiving soil health cards after sowings have commenced	0	0	0	128	164	0	26	80	400	17040	42.6	V
3	Collecting soil samples in an unscientific manner	0	112	16	148	50	0	55	17	400	20932	52.3	IV
4	Lack of knowledge on nutrient deficiencies	0	0	0	0	80	95	103	121	400	13414	33.5	VII
5	Lack of availability of subsidy inputs	0	0	0	86	68	124	66	53	400	16075	40.1	VI
6	Difficulty in understanding the information given in the soil health card and calculating fertilizer dose on the basis of nutrient status of soil	178	18	202	0	0	0	0	0	400	27507	68.7	II
7	Fear of reduced yields/lack of faith in results/ improvement in yield	113	131	117	37	0	0	0	0	400	26802	67.0	III
8	Unwilling to change	0	0	0	66	16	40	137	138	400	12707	31.7	VIII

The table no. 3 indicating Garrett ranking analysis of constraints in the use of Soil Health Cards (SHCs) revealed several major limiting factors among the respondents. The foremost constraint identified was the lack of pre-seasonal training on SHC usage, which recorded the highest mean score of 70.1 (Rank I), indicating that farmers faced considerable difficulty in effectively utilizing SHC recommendations without proper guidance. The second most significant constraint was the difficulty in understanding SHC information and calculating

appropriate fertilizer doses, with a mean score of 68.7 (Rank II). This was followed by apprehensions regarding reduced crop yields or a general lack of faith in the results of SHC-based interventions (Mean score: 67.0, Rank III). Other notable constraints included unscientific soil sample collection (Rank IV), delays in receiving SHCs (Rank V), unavailability of subsidized inputs (Rank VI), lack of knowledge regarding nutrient deficiencies (Rank VII), and resistance or unwillingness to adopt recommended practices (Rank VIII). These findings are

consistent with previous studies (Singh *et al.*, 2020) [15], which similarly emphasized the critical role of timely training and

technical support in ensuring the effective use of SHCs.

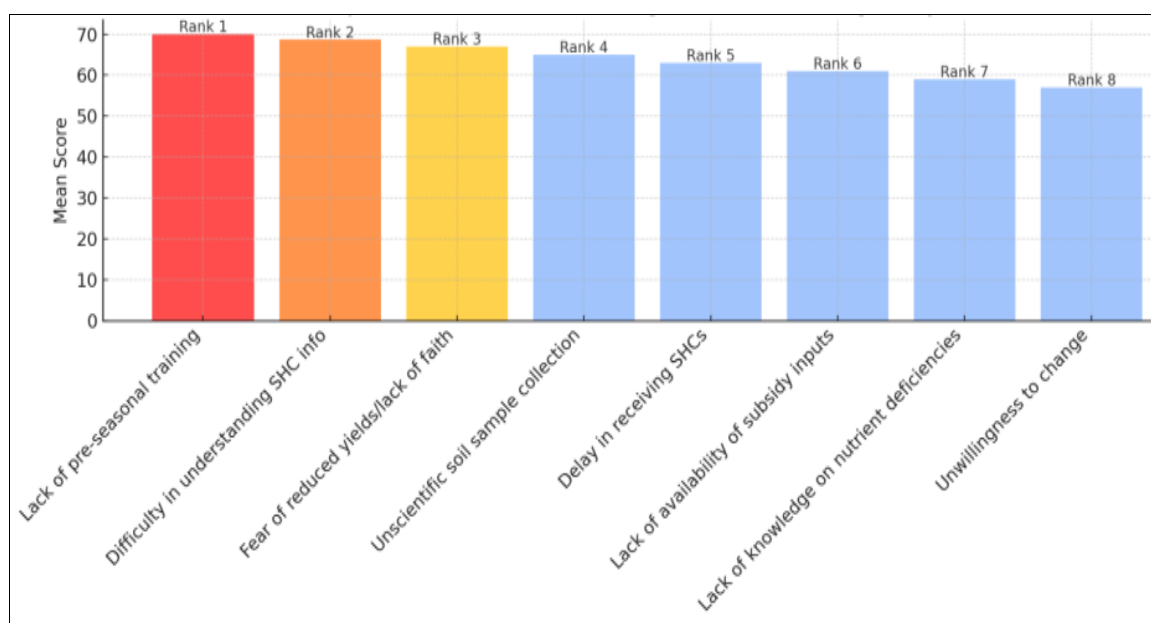


Fig 4: Major Constraints in SHC Usage (Garrett Ranking Analysis)

Conclusion

The study reveals that although farmers in Northern Telangana generally hold a positive perception of Soil Health Card (SHC) recommendations, their practical feasibility and actual usage remain limited. Key constraints, including inadequate training, difficulty in interpreting SHC information, and delayed distribution, continue to hinder adoption. To improve the effectiveness of the SHC scheme, it is recommended to organize pre-seasonal training programs and demonstrations, ensure timely distribution of SHCs before sowing, simplify information through pictorial formats and localized extension support, and provide input subsidies aligned with SHC recommendations. Adopting a farmer-centric extension approach will enhance the utilization of SHCs and support sustainable soil fertility management across the region.

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