

International Journal of Agriculture Extension and Social Development

Volume 9; Issue 7; July 2026; Page No. 522-526

Received: 24-04-2026
Accepted: 28-05-2026

Indexed Journal
Peer Reviewed Journal

Farmers' perception towards utility of soil health card in Meerut district of Uttar Pradesh

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DOI: <https://www.doi.org/10.33545/26180723.2026.v9.i7g.3906>

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Abstract

Soil health underpins the long-term productivity of agricultural systems, yet imbalanced fertilizer application continues to erode soil fertility in intensively cultivated parts of India. In response, the Government of India introduced the Soil Health Card Scheme to furnish farmers with field-specific nutrient status reports and crop-wise fertilizer recommendations. How well this scheme performs, however, depends less on the information it delivers than on how farmers perceive its usefulness, a perception that determines whether the recommendations are understood, trusted, and ultimately applied. While a growing body of work has examined this question across southern and central India, comparatively little is known about farmer perception in the intensively fertilized tracts of western Uttar Pradesh. This study was undertaken to fill that gap, examining farmers' perception towards the utility of the Soil Health Card in Meerut district. An ex-post facto design was used, with respondents selected through a purposive, multi-stage procedure: the Western zone of Uttar Pradesh, followed by Meerut district, two blocks with the highest scheme utilization, four villages per block, and ten farmers per village, yielding a total sample of 80. Perception was assessed through a pilot-tested structured schedule, and the resulting data were examined using frequency, percentage, mean, standard deviation, correlation, and ranking. Farmers showed the strongest agreement with statements concerning the scientific rigour of soil sampling and the value of micronutrient reporting, while the weakest agreement concerned the regularity of follow-up support from agricultural officers. Overall, more than four in five respondents (83.75%) fell in the medium-to-high perception category. The results point to a scheme that farmers find technically credible but whose extension follow-through leaves room for improvement, a distinction with direct implications for how the programme is delivered on the ground.

Keywords: Soil health, farmers' perception, nutrient management, agricultural extension, sustainable farming, rural development

Introduction

Few single factors shape the productivity and resilience of a farming system as directly as the condition of the soil it depends on. Global recognition of soil as a finite, increasingly degraded resource has pushed soil health into mainstream policy discourse under the Sustainable Development Goals, with land degradation neutrality now treated as a core target rather than a peripheral concern. Soils regulate water, cycle nutrients, store carbon, and sustain biodiversity, and any erosion of these functions eventually shows up as lower yields, higher input dependency, and diminished ecosystem services for the future. As global demand for food, fibre, and fodder continues to rise, keeping soils fertile through evidence-based management has become a policy priority across both industrialized and developing economies. India is a sharp illustration of this pressure: a land base that accounts for a small fraction of the world's geographical area

must nonetheless support a substantial share of its population. Decades of intensive cropping since the Green Revolution, compounded by fertilizer regimes that have tended toward imbalance rather than outright shortage, have left large stretches of Indian farmland with declining organic carbon and recurring multi-nutrient deficits. Much of this stems from how fertilizer decisions get made in the first place: farmers have typically relied on blanket recommendations or on the advice of input dealers rather than on the actual nutrient status of their own fields. The result is not only wasted expenditure but real environmental costs, including nitrate leaching into groundwater and higher emissions associated with excess nitrogen use.

Balanced nutrient management, meaning fertilizer application calibrated to soil-test values and crop requirement, offers a scientifically defensible way through this problem. Where farmers have received targeted, field-

level nutrient information, fertilizer-use efficiency has improved and cultivation costs have fallen appreciably. Field studies evaluating soil-test-based recommendations have reported yield increases in the order of 25 to 33 per cent for major cereal and cash crops, alongside meaningful reductions in per-acre cultivation cost. Realizing these gains at scale, however, requires more than distributing test results; it requires that farmers understand, trust, and act on them, and this behavioural dimension has often been underexamined relative to the agronomic one.

It was in this context that the Government of India launched the Soil Health Card Scheme in 2015, with the aim of giving every landholding farmer a biennial report on soil nutrient status along with crop-specific fertilizer and amendment recommendations. The intent was to make balanced nutrient management a routine extension service rather than a one-off advisory. This was accompanied by a substantial buildout of supporting infrastructure, including soil-testing laboratories, mobile testing units, training for extension staff, and integration with the broader Integrated Nutrient Management framework. Yet despite this investment, evidence from across the country points to an uneven translation of awareness into practice: national data show that while a large majority of farmers are aware of the scheme, considerably fewer understand its recommendations, and fewer still act on them. This gap between knowing about a scheme and acting on it is precisely why farmer perception matters so much in extension research. Perception is the filter through which any technical recommendation gets judged for its relevance and trustworthiness. Studies of the Soil Health Card scheme bear this out, and the picture varies considerably by region. In some districts, moderate-to-high perception has been linked to education, mass-media exposure, and scientific orientation in others, Haryana being a notable case, perceived benefit has remained persistently low, in part because annual land-lease arrangements discourage the kind of long-term thinking that soil investment requires¹⁰. Constraint-focused studies point to recurring practical problems, including delayed card delivery, weak follow-up from extension staff, and limited farmer confidence in laboratory results. Analyses of use efficiency in Telangana have further identified socio-personal and institutional variables as consistent predictors of both perception and adoption behaviour. This is broadly consistent with technology-acceptance research more generally, where perceived usefulness and ease of use remain strong predictors of whether any new agricultural information tool receives sustained use.

Even so, most of the existing perception literature on this scheme sits in the southern and central states, including Telangana, Andhra Pradesh, and Chhattisgarh, leaving the intensively cultivated, fertilizer-heavy agro-ecosystems of western Uttar Pradesh comparatively unexamined. Meerut and its surrounding districts, with their smallholding structure and sugarcane-wheat-paddy rotations, present a different socio-agronomic setting from those studied elsewhere, and there is no strong reason to assume farmer perception here will mirror patterns documented in other regions. Extension planning that proceeds without this local evidence risks applying a template that does not fit local constraints, which would only perpetuate the awareness-adoption gap already visible at the national level. Generating district-specific evidence on how farmers actually perceive the scheme, and

what shapes that perception, is therefore a necessary and currently missing piece of the picture.

The present investigation was therefore undertaken to study farmers' perception towards utility of Soil Health Card in Meerut district of Uttar Pradesh.

Materials and Methods

Locale of the Study

Administratively, Uttar Pradesh comprises 75 districts distributed across four economic zones: Western, Central, Eastern, and Bundelkhand. Given the university's jurisdictional coverage of the Western zone, and the relatively high cropping intensity that characterizes this belt, it was taken up as the study area.

Selection of the District

Meerut was selected from among the zone's 26 districts on three grounds: its intensive farming systems, the range of crops grown there, and its position within the Delhi NCR, which brings it closer to input markets and extension infrastructure than many other districts. A survey covering the entire state was outside the scope of the time and resources available, so the investigation was narrowed to this one district as a representative case.

Selection of the Blocks

Of the 12 blocks in Meerut district, two were purposively selected on the basis of the highest recorded utilization of the Soil Health Card scheme.

Selection of the Villages

Within each of the two selected blocks, four villages were purposively chosen using the same criterion of maximum scheme utilization, giving eight villages in total.

Selection of the Respondents

Ten farmers were purposively selected from each village, for a total sample of 80 respondents.

Research Design

An ex-post facto design was used, appropriate given that the perceptions under study had already formed prior to the investigation and were not something the researcher could manipulate or control.

Sampling Technique

Purposive sampling was applied consistently at every stage, zone, district, block, village, and respondent, guided throughout by the study's focus on areas of high scheme utilization.

Variable Under Study

The single variable examined was farmers' perception of the Soil Health Card scheme.

Measurement of Perception

Perception was measured with a structured interview schedule developed on the basis of a preceding pilot study and administered through personal interviews.

Statistical Analysis

Data were analyzed using frequency, percentage, arithmetic

mean, standard deviation, correlation coefficient, and ranking.

Ethical Statement

Informed consent was obtained from all respondents before data collection, participation was voluntary, and confidentiality of the information provided was maintained

throughout.

Results and Discussion

Perception of Farmers towards Utility of Soil Health Card

Table 1 presents the statement-wise pattern of agreement, indecision, and disagreement among the 80 respondents.

Table 1: Distribution of respondents according to their perception towards utility of Soil Health Card (n = 80)

S. No.	Statements	Agree F(%)	Undecided F(%)	Disagree F(%)
1	Soil Health Card provides farmers with information about the micronutrients present in their soil.	61 (76.25)	08 (10.00)	11 (13.75)
2	Use of the Soil Health Card helps in reducing the cost of fertilizers used in farming.	54 (67.50)	12 (15.00)	14 (17.50)
3	Soil Health Card helps farmers to obtain higher yields and provides information on crop selection according to soil type.	56 (70.00)	11 (13.75)	13 (16.25)
4	Based on the information provided in the Soil Health Card, farmer can correct nutrient imbalance, soil pH, and soil EC to maintain soil health.	57 (71.25)	13 (16.25)	10 (12.50)
5	Farming practices can be managed in a scientific manner by using the information provided in the Soil Health Card.	53 (66.25)	15 (18.75)	12 (15.00)
6	Soil samples for soil testing should be collected using scientific methods.	64 (80.00)	07 (08.75)	09 (11.25)
7	Information related to the Soil Health Card is regularly provided by agricultural officers.	42 (52.50)	18 (22.50)	20 (25.00)
8	Based on the information about available organic carbon (OC) given in the Soil Health Card, required organic materials can be applied to the soil.	51 (63.75)	15 (18.75)	14 (17.50)

Note: A = Agree; UD = Undecided; DA = Disagree

The statement drawing the strongest agreement, “soil samples for soil testing should be collected using scientific methods” (80.00%), together with the near-equally high endorsement of micronutrient reporting (76.25%), suggests that farmers place considerable trust in the technical process behind the scheme, even where their grasp of what to do with the results is somewhat weaker. Reddy’s national-level analysis found a similar pattern: awareness of the scheme was consistently higher than farmers’ actual understanding of its recommendations. The strength of agreement on micronutrient disclosure specifically echoes earlier work tying utility perception to farmers’ direct exposure to the soil-testing process itself.

The picture looks different at the other end of the table. The statement on regular follow-up from agricultural officers drew the least agreement (52.50%) and the most outright disagreement (25.00%) of any item, with a full quarter of respondents feeling this support was lacking. Read alongside the strong endorsement of the sampling and micronutrient statements, this points less to a problem of credibility than to one of delivery: farmers are not doubting the science, but they are not always getting the follow-through. Similar patterns have been reported in Haryana, where constraints tied to scheme delivery and post-distribution guidance outweighed constraints related to understanding the recommendations themselves. The somewhat lower agreement on cost reduction (67.50%) and on scientific farm management (66.25%) points in the same direction: farmers are less convinced that the economic and practical payoff of the scheme has fully materialized in their own fields, a hesitation also documented in earlier work examining constraints in soil health card use.

Overall Distribution of Respondents Based on Farmers’ Perception

Table 2: Overall distribution of respondents on the basis of perception towards utility of Soil Health Card (n = 80)

Perception towards Utility of Soil Health Card	Frequency	Percentage (%)
Low (8–13)	13	16.25
Medium (14–18)	42	52.50
High (19–24)	25	31.25
Total	80	100.00

Over half the sample (52.50%) fell into the medium perception category, with a further 31.25 per cent in the high category and only 16.25 per cent in the low category, putting 83.75 per cent of respondents at medium-to-high perception overall. This is broadly in line with findings from Rangareddy district in Telangana, where the majority of card holders similarly clustered in the moderate perception band^{9,17}, and with the Bilaspur study in Chhattisgarh, where education, mass-media exposure, and scientific orientation together produced a predominantly medium-to-high perception profile⁸. It sits less comfortably alongside the Haryana findings, where perceived scheme benefit remained low overall, a pattern that study’s authors attributed largely to short-term land-lease arrangements discouraging investment in soil health¹⁰. The comparatively larger share of high-perception farmers in the present sample may owe something to Meerut’s position within the Delhi NCR, where intensive, diversified cropping and better market and institutional access likely give farmers more exposure to both extension communication and soil-testing infrastructure than in some of the other districts studied.

Read together, these results suggest that farmers in Meerut are largely persuaded by the science underlying the Soil Health Card but are less satisfied with how consistently that science is followed up on the ground. This fits a familiar pattern in extension research, where adoption of any innovation tends to hinge as much on how accessible and

well-supported it feels as on its technical merit. The clearest lesson from this study is that closing the gap between favourable perception and sustained field-level adoption will depend on strengthening the extension follow-through, not on convincing farmers of the scheme's underlying value, which appears already largely accepted.

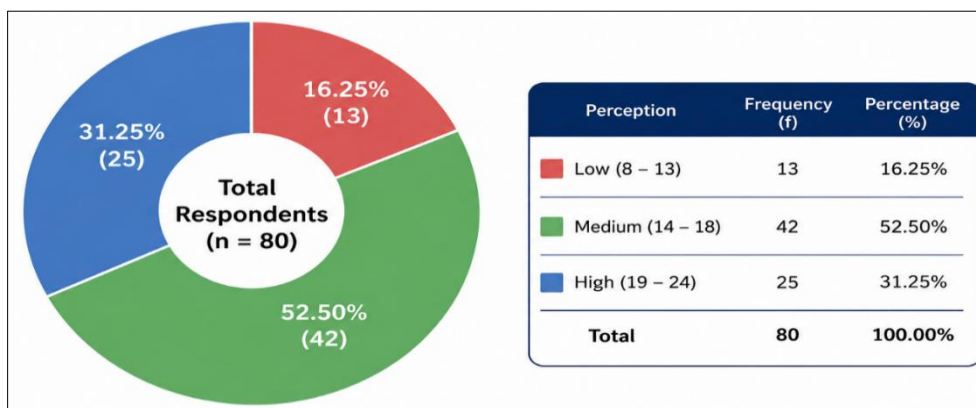


Fig 1: Overall distribution of respondents based on level of perception (Low, Medium, High) towards utility of Soil Health Card.

Conclusion

Most farmers surveyed in Meerut district held a medium-to-high perception of the Soil Health Card's utility (83.75% combined), with 52.50 per cent in the medium band and 31.25 per cent in the high band; only 16.25 per cent registered low perception. The statements drawing the strongest agreement concerned the scientific credibility of soil sampling and the value of micronutrient reporting, while the weakest agreement concerned how regularly agricultural officers followed up with information, a gap between trust in the science and satisfaction with its delivery.

Practical implications: These findings suggest farmers are receptive to soil-test-based advice and recognize its role in correcting nutrient imbalances, lowering fertilizer costs, and improving crop choice, but that the benefits of the scheme are not being fully realized in the field because post-distribution support is inconsistent.

Policy implications: This argues for redirecting attention away from card distribution as an end point and toward strengthening the extension delivery chain that follows it, particularly the frequency and quality of officer-farmer contact.

Recommendations: Extension agencies would do well to build in regular follow-up visits, farmer interaction sessions, and clearer explanatory materials to help farmers act on the recommendations, alongside continued capacity building for field-level staff.

Future research: Future work might usefully examine how perception actually translates into adoption behaviour, test these findings against a larger and more varied sample, and compare results across agro-climatic zones to see how far the Meerut pattern generalizes.

Acknowledgement

The authors gratefully acknowledge the cooperation

extended by the farmers of the surveyed villages in Meerut district during data collection, and the support of the Department of Agricultural Extension for facilitating the field investigation.

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