International Journal of Plant & Soil Science

34(18): 277-285, 2022; Article no.IJPSS.87132
ISSN: 2320-7035

Awareness Regarding Soil Health Card and Obstacles in Adoption of its Recommendations in the Karaikal District of Puducherry U.T. in India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJPSS/2022/v34i1831079

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/87132

Original Research Article

Received 07 March 2022
Accepted 11 May 2022
Published 12 May 2022

ABSTRACT

Aims: To study the awareness regarding Soil Health Card and constraints encountered in adoption of Soil Health card Recommendations and suggestions in Karaikal district of Puducherry U.T.
Study Design: Purposive random sampling.
Place and Duration of Study: The study was conducted in the Karaikal district of Puducherry U.T. and the survey was conducted during September 2021 and October 2021.
Methodology: The random sampling of 120 respondents from Karaikal district who had soil health cards. Among the two Taluks (Karaikal and Thirunallar), total six Firkas were selected purposively and 20 farmers from each Firkas were selected through a random sampling technique. From the 120 sample respondents, information regarding the study was collected with a structured interview schedule. Percentage and distribution were employed to know about the socio-economic profile of respondents and their awareness level regarding the Soil Health card another tool used is Garrett ranking technique to rank constraints faced by the respondents.

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Results: It was discovered that farmers were aware of the Soil health card suggests conservative measures for sustainable soil health and it increases yield, which also reduces additional costs incurred for fertilizer purchases by giving fertilizer recommendations for the particular field, etc. Garret ranking analysis revealed that the major constraint encountered in the adoption of soil health card recommendations is that the information on Soil Health Card is not in the local language followed by recommendations are not calculated based on farmers' land holdings, inaccessibility of micro-nutrient fertilizer in the market, etc.
Conclusion: To overcome these constraints Farmer's training on the use of a Soil Health Card by calculating a recommended dose of fertilizers and the information on the Soil Health Card should be in the local language is recommended.

Keywords: Awareness; constraint; soil health card; garrett ranking.

1. INTRODUCTION

A natural environment provides essential functions that support life without impeding the advancement of human civilization. Human history has always been linked to the use of natural resources, and it seems likely that this will continue in the future. People's awareness of how to effectively manage natural resources such as air, water, and soil [1] and, ultimately, how to avoid their loss or degradation, determines a civilization's success or failure. Water, air, and soil resources all require the same level of concern and protection from degradation caused by indiscriminate human activity. Chemical pollutants are one of the most serious dangers to the above-mentioned natural resources, either directly or indirectly. However, unlike the use of air and water, the use of soil (as a source of food, fiber, and fodder) since the beginning of agriculture necessitates a change in its fundamentals [2].

Soils are essential to lifestyles on Earth however human pressures on soil assets are accomplishing essential limits and it materials the vital nutrients, water, oxygen, and root aid that our food-generating flora want to develop and flourish [3]. Proper soil management is one vital detail of sustainable agriculture and additionally affords a precious lever for weather law and a pathway for protecting environment offerings and biodiversity [4]. Soil is a vital aid with numerous ecological features and socioeconomic contributions. It is largely a non-renewable aid with doubtlessly speedy degradation charges an extraordinarily low formation and regeneration processes. However, abuse and mismanagement are threatened by increasing demands for inconsistent use and eroding sustainability [5]. It holds five interconnected services besides moderating the water cycle, namely, it provides physical support to the seeds by, supplies and retaining nutrients to the soil, plays a major role in the decomposition of organic wastes, inorganic chemicals result from decomposition return to chemicals result from decomposition returns to the plant as a nutrient, the soil is a key factor in the regulation of elemental cycles [6]. Soil, on the other hand, is multifunctional and cannot supply all ecosystem functions in one location at the same time. The Soil Health Card program connects together the agricultural-scientific community, an information repository of the newest technologies, techniques, and cropping practices, and the government for the benefit of the general public [7]. However, due to extremely poor coverage and a delay in the timely distribution of fertilizer recommendations to farmers, India's soil health card program has failed to have the desired influence on the farming community [8]. In light of these facts, an attempt was made to examine farmers' awareness and the constraints they encounter in utilizing the Soil health card recommendations.

2. METHODOLOGY

The present study was conducted in the Karaikal of Puducherry U.T. which was selected purposively. Among the two Taluks (Karaikal and Thirunallar), total six Firkas were selected purposively and 20 farmers from each Firkas were selected through a random sampling technique. Several categories of constraints were formulated through literature review, opinions of the various experts, and perceptions of extension personnel. The reliable information regarding the study was gathered utilizing a semi-structured questionnaire. The tools and techniques employed to study the socio-economic profile and awareness about Soil health card recommendations and constraints encountered were described below

2.1 Descriptive Analysis

Percentage and averages of key variables were worked out to bring out the general characteristics of sample farms and awareness in the study area.

2.2 Garrett Ranking Technique

Garrett ranking technique was used to assess the constraints in the adoption of the soil health card scheme. The respondents were asked to rank (in the order of severity) the constraints and these ranks were converted to scores by referring to the Garrett table. Each of the 120 farmers was asked to rank the constraints. In this analysis, rank one meant the most important factor; and nth rank meant the least important factor. In the next stage, the rank assigned to each factor under constraints and strategies by each respondent was converted into percent position using the formula:

Percent position = 100 $(R_{ij} - 0.5)/N_j$

where R_{ij} = Rank given for the i^{th} item by the j^{th} individual

N_j = Number of items ranked by the j^{th} individual

The percent position of each rank was converted to scores by referring to the table and practical approaches of the past study [9]. Then, for each factor, the scores of individual respondents were summed up and divided by the total number of respondents for whom scores were gathered. The mean scores for all the factors were ranked by assigning ranks 1,2,3 etc., in the descending order of the mean scores.

3. RESULTS AND DISCUSSION

The government is taking several promoting and conservative measures such as recommending soil test-based recommendations through the collective use of both inorganic and organic sources of nutrient management to sustain better soil health and increased crop productivity [10]. The socioeconomic profile of the respondents was enlisted in the below Table 1 and Figs. 1a to 1h. The details on the age-wise distribution of sample respondents are presented in Fig. 1a, in which they are classified under four categories viz., less than 35 years, 36-45 years, 46-55 years, and above 55 years.

From the Table 1 and Fig. 1a, results showed that in selected respondents, 57 farmers (47.50 percent of the farmers) fall in the age group between 46 to 55 years followed by 33 farmers (27.50 percent) in the age group of more than 55 years, 20 farmers (16.67 percent) were between 36 to 45 years and 10 farmers (08.33 percent) falls under the category less than 35 years. The respondent's educational qualifications have a significant impact on the adoption of any technology. In Fig. 1b, the selected farmers were classified into four groups illiterate, primary education, secondary education, and graduation and it is revealed that the overall respondent percent had completed their higher secondary education followed by primary school educated (31.70 percent), college education (23.30 percent) and illiterates (11.70 percent). These findings are more or less in line with the findings of the past study [11] and its results reveal that the majority of farmers (60.83 percent) are between the ages of 40 and 50, while 26.67 percent are over the age of 50. The majority of the farmers (39.17 percent) had completed primary school, while 29.17 percent had completed secondary school.

Fig. 1c depicts that among the respondents, 97 farmers were male and 23 were female. From Fig. 1d, Among the selected respondents, 65 farmers (54.17 percent of the farmers) in Karaikal considered agriculture as the mainstay and the rest were doing agriculture as a secondary occupation. The finding also confirmed the past research finding [12] as male farmers were higher than female farmers and their primary occupation was agriculture in their study.

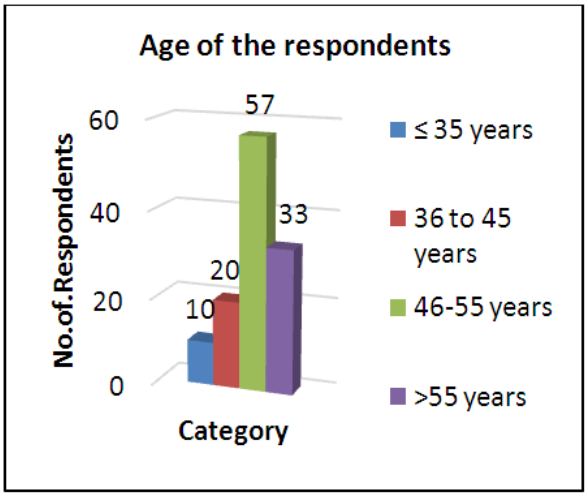
Fig. 1e shows that among the selected farmers, 64 respondents (53.33 percent) were marginal farmers, followed by 35 respondents (29.10 percent) were small farmers, 19 respondents (15.83 percent) were medium-size farmers and 2 respondents (01.67) percent were large farmers. The results of the past study [13] are more or less in line with the present study findings and reveal that 32.5 percent of farmers were marginal and small, 47.92 percent of farmers were semi medium and medium and 35.83 percent of farmers leased land along with their own land). The size of the family has important implications with respect to the income of the sample households and the extent of consumption expenditure which determined the potential for saving and in turn, investment. The details on the family size of the sample farmers are given in Table 1 and Fig. 1f. The selected farmers were classified into three groups households with less than 4 members, 4-6 members, and more than 6

members. It is revealed that overall, among respondents 25 respondents (20.80 percent) had less than four members, followed by 86 respondents (71.62 percent) with 4 to 6 members and 19 respondents (07.50 percent) had more than 6 family members. These findings are consistent with the results found in a previous study [14].

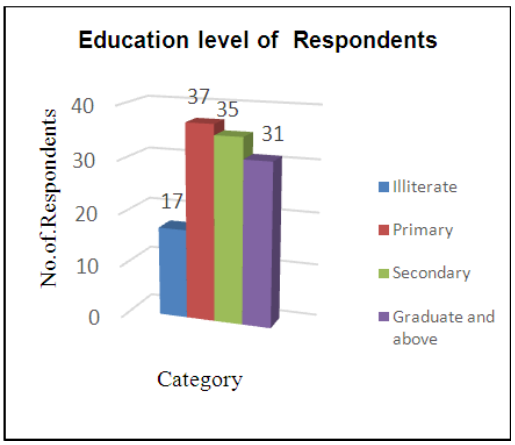
Table 1. Socioeconomic profile of the sample respondents n=120

S. No.	Particulars	Category	Number of farmers	Total Number of Farmers
1.	Age	≤ 35 years	10 (08.33)	120 (100.00)
		36 to 45 years	20 (16.67)	
		46-55 years	57 (47.50)	
		>55 years	33 (27.50)	
2.	Education	Illiterate	17 (14.18)	120 (100.00)
		Primary	37 (30.83)	
		Secondary	35 (29.16)	
		Graduate and above	31 (25.83)	
3.	Gender	Male farmers	97 (80.83)	120 (100.00)
		Female farmers	23 (19.17)	
4.	Occupation	Agriculture as a Primary occupation	65 (54.17)	120 (100.00)
		Agriculture as a Secondary occupation	55 (45.83)	
5.	Landholding	Marginal farmer (< 1ha)	64 (53.33)	120 (100.00)
		Small farmer (1-2 ha)	35 (29.17)	
		Medium (2-4 ha)	19 (15.83)	
		Large (4-10 ha)	2 (01.67)	
6.	Family Size	<4 members	25 (20.83)	120 (100.00)
		4 to 6 members	86 (71.67)	
		>6 members	19 (07.50)	
7.	Annual income	≤ Rs.1,00,000	26 (21.67)	120 (100.00)
		Rs.1,00,000 to Rs.3,00,000	49 (40.83)	
		>Rs.3,00,000)	45 (37.50)	
8.	Experience in Farming	≤ 10 years	19 (15.83)	120 (100.00)
		11-20 years	18 (15.00)	
		21-30 years	45 (37.50)	
		>30 years	38 (31.67)	

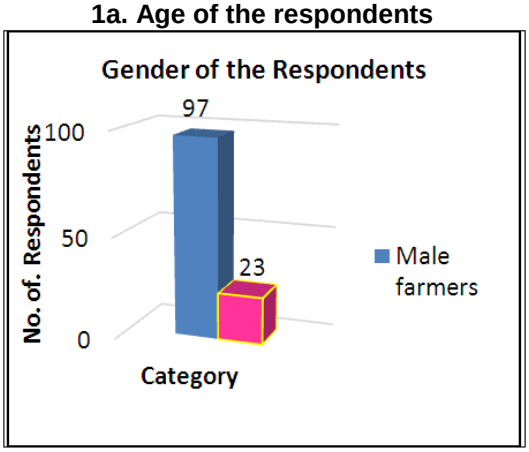
(Note: Figures in parenthesis indicate percentage to total)



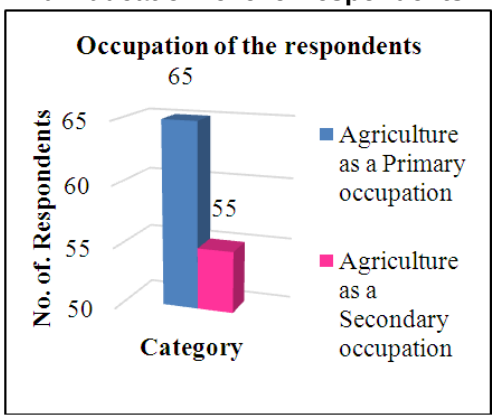
1a. Age of the respondents



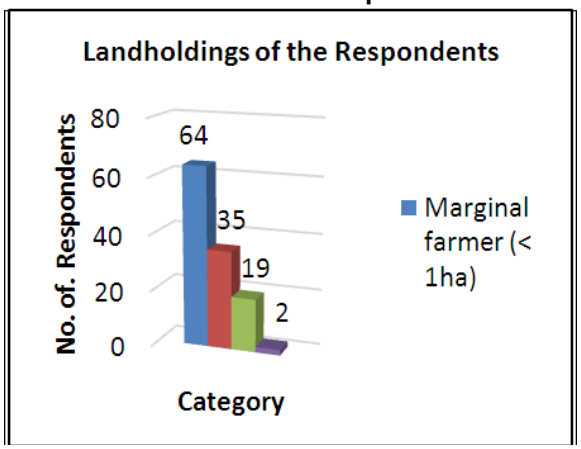
1b. Education level of respondents



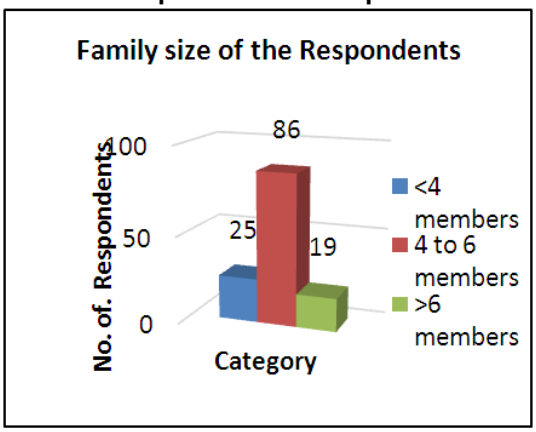
1c. Gender of the Respondents



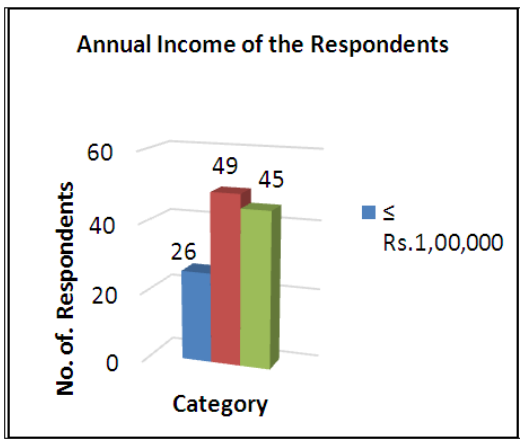
1d. Occupation of the respondents



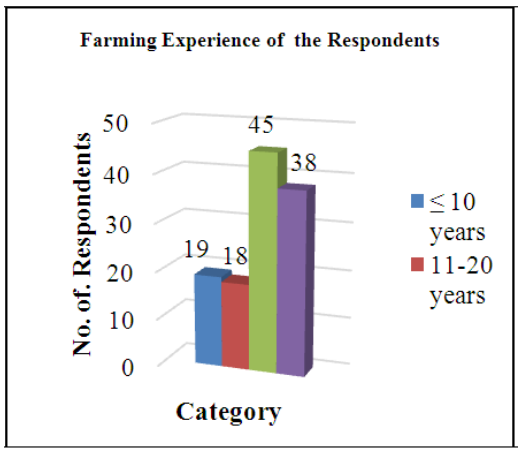
1e. Landholdings of the Respondents



1f. Family size of the Respondents



1g. Annual Income of the Respondents



1h. Farming Experience of the Respondents

Fig. 1. (1a to 1h): The socio-economic profile of the respondents

Table 2. Awareness of soil health card information and its Recommendations (n=120)

S. No.	Awareness about soil health cards and its Recommendations	Yes	No
1.	Soil health card suggests conservative measures for sustainable soil health and it increases yield	75 (62.50)	45 (37.50)
2.	Soil health card reduces additional costs incurred for fertilizer purchases by giving fertilizer recommendations for the particular field	90 (75.00)	30 (25.00)
3.	Soil health card gives the status of primary and secondary nutrients in the soil of the particular field	82 (68.33)	38 (31.67)
4.	The soil health card assists by giving suggestions and recommended dosages of fertilizers for that particular soil tested plot	88 (73.33)	32 (26.67)
5.	Soil health card guidance is principle-based "right time right quantity and right amount"	99 (82.50)	21 (17.50)
6.	Soil health card gives efficient outcome when its recommendations were regularly followed	100 (83.33)	20 (16.67)
7.	Soil health card guides farmers to know the excessive usage of fertilizers	103 (85.83)	17 (14.17)

(Note: Figures in parenthesis indicate percentage to total)

In Fig. 1g, the Majority of the respondents (49 respondents,40.83 percent) fall under the category Rs.1,00,000 to Rs.3,00,000 of Annual income similar results were obtained in the study [13] reveal that a major proportion, 64 percent of farmers had income between Rs 2-8 lakh and only a few farmers (2.92 percent) had income less than 2 lakh per annum.

The experience of the farmers made them more certain about the decision-making regarding farming practices. The number of years of experience in the farming of the sample farmers is given in Table 1 and Fig. 1h. The farming years of experience were grouped as less than 10 years, 11-20 years, 21-30 years, and more than 30 years. From the Table 1 and Fig. 1h, it could be observed that 45 respondents (37.50 percent of the respondents) had the farming experience of 21 to 30 years followed by 38 respondents (31.67 percent) with more than 30 years of experience, 19 respondents (15.83 percent) with less than 10 years of experience and 18 respondents (15.00 percent) had11 to 20 years of experience. The majority of the farmers (51.67 percent) had more than 21 years of farming experience [13].

From the Table 2, It was found that the majority of sample respondents (62.50 percent) were aware of the Soil health card suggests conservative measures for sustainable soil health and it increases yield, which also reduces additional costs incurred for fertilizer purchases by giving fertilizer recommendations for the particular field (75.00 percent). In further investigation majority of respondents (68.33 percent) were aware that the Soil health card gives the status of primary and secondary nutrients in the soil of a particular field, and a major portion of the farmers (73.33 percent) in the study area were aware of that the soil health card assists by giving suggestions and recommended dosages of fertilizers for that particular soil tested plot. The above-mentioned findings are more or less in line with the findings of [10] and reported that they are aware of the SHC scheme (63.30 percent).

It was observed that Most of the farmers (82.50 percent) were aware that Soil health card guidance is principle-based "right time right quantity and right amount". Similarly, the proportion of 83.33 percent of the total respondents was aware of the Soil health card gives efficient outcome when its recommendations were regularly followed. 85.83 percent of the respondents were aware that the Soil health card guides farmers to know the excessive usage of fertilizers. The study was supported by a previous study [15] which reported that the majority of farmers (95 percent) were aware of the soil health card, which provides information about the state of accessible nutrients (Macro & Micro) in the soil and provides corrective measures for increasing soil health and productivity (82 percent). Further investigation revealed that the majority of farmers (88 percent) were aware that the Soil Health Card helps to reduce extra expenditure by supplying required nutrients status in the soil, and the majority of farmers (80 percent) were aware that the Soil Health Card helps the farmers to get an idea on crop-wise recommendations of nutrients and fertilizers required in each type of soil. Their study [12] discovered that the majority of farmers (79.17 percent) were aware of the utility of the Soil Health Card.

The constraints reported by the respondents while adopting soil health card recommendations are recommendations are not calculated based on farmers' land holdings, the information on soil health cards is not in the local language, inaccessibility of micro-nutrient fertilizer in the market, insufficient knowledge regarding the significance of micronutrients, soil analysis, and fertilizer recommendations was not compelling and no regular monitoring, lack of NPK fertilizer and its various forms and unavailability of organic manure. The above-mentioned constraints are ranked with their corresponding mean score are given in Table 2 and Fig. 2. Among the constraints listed by the sample respondents, the information on soil health cards is not in the local language and is ranked as the most important constraint with rank first; recommendations are not calculated based on farmers' land holdings followed next. The inaccessibility of micro-nutrient fertilizer in the market ranked as the third constraint. Soil analysis and fertilizer recommendations were not compelling and no regular monitoring ranked last as a less important constraint. There are some past studies [11] that analyzed the constraints faced by the farmers while adopting and following soil health card recommendations were concluded that the inability to understand all of the information on the card was the first constraint, with a mean score of 96 percent, followed by a time gap between soil samples collected and issuing cards that are too long (82.8 percent), a lack of proper scientific guidance (72 percent), fertilizer prices that are too high (63.6 percent), a lack of soil amendments such as bio-fertilizers and organic manure (56.4 percent), and a lack of micronutrient fertilizers in the market (49.2 percent). A similar study [13] was carried out to find the challenges encountered and concluded that farmers experienced considerable challenges due to insufficient follow-up by extension agencies, improper techniques of collecting soil samples, and results that were not effectively communicated. Farmer's minor concerns were that it was difficult to implement the recommendations, the results were too technical to understand and some believed that the SHT offered a meager level of benefits. A similar study [16] on examination of the constraints faced by farmers in Rajasthan's Sri Ganganagar district concluded that the respondent's most significant constraints to implementing the Soil Health Card scheme were a lack of understanding of the need for micronutrients, lack of mobile soil testing vans, unavailability of micronutrients in the market and lack of enthusiasm.

Table 3. Constraints Encountered by farmers in adoption of Soil Health Card Recommendations

S. No.	Constraints	Mean score	Rank
1	Recommendations are not calculated based on farmers' land holdings	58.76	II
2	The information on Soil Health Card is not in the Local language	63.97	I
3	Inaccessibility of micro-nutrient fertilizer in the market	53.93	III
4	Insufficient knowledge regarding the significance of micronutrients	44.99	V
5	Soil analysis and fertilizer recommendations were not compelling and no regular monitoring	17.43	VII
6	Lack of NPK fertilizer and its various forms	46.48	IV
7	Unavailability of Organic Manure	29.32	VI

Source: Primary Survey (2021)

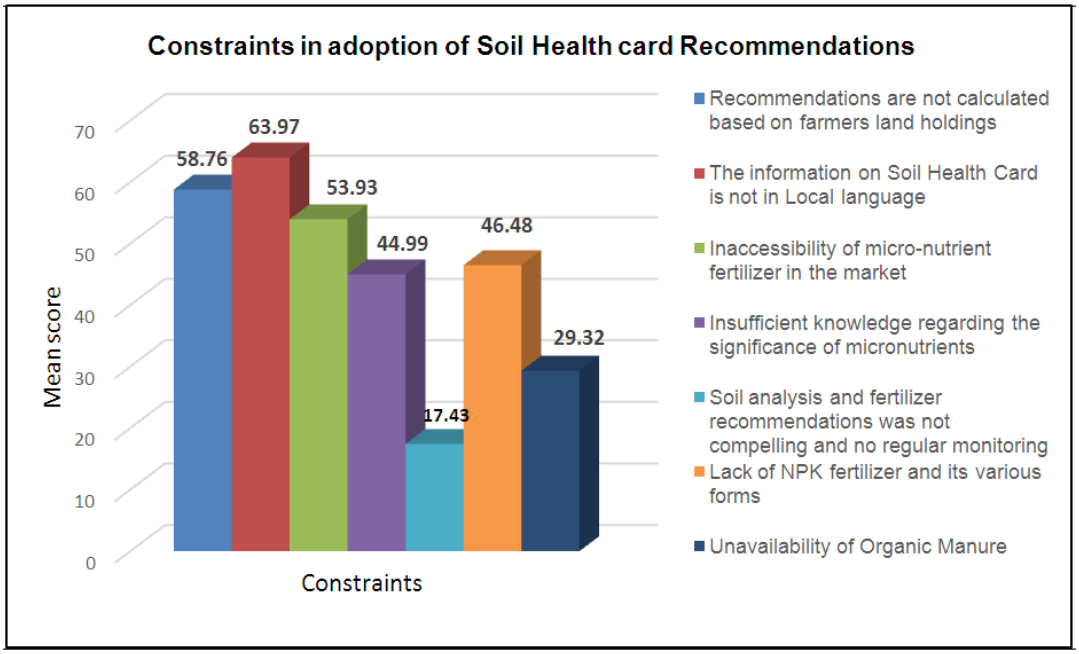


Fig. 2. Constraints in adoption of Soil Health Card recommendations
Source: Primary Survey (2021)

4. CONCLUSION

In this survey, it can be concluded that the majority of the sample respondent from the Karaikal region are of middle age and educated. According to the findings of the study on farmers' knowledge and awareness of the Soil Health Card Scheme, roughly three-fourths of the sample respondents are aware of the scheme, and more than half of the farmers have a medium level of understanding of its utility and importance. The majority of farmers facing problems in the adoption of soil health card recommendations is that the information on Soil Health Card is not in the local language, recommendations are not calculated based on farmers' land holdings, and inaccessibility of micro-nutrient fertilizer in the market were major constraints. So, in order to take the edge off these constraints, the State Government may train the farmers about the significance of soil health cards through training sessions and awareness camps. The government should also take the appropriate measures to guarantee that Extension staff can take the lead in overcoming the barriers to technology use, soil health cards should be available in the local language, and provide subsidies to low-cost methods to produce organic manures by farmers in small-scale level.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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