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

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 random sampling technique. From the 120 sample respondents, information regarding study were collected with structured interview schedule. Percentage and distribution was employed to know about the socioeconomic profile of respondents and their awareness level regarding Soil Health card and another tool used is Garrett ranking technique to rank constraints faced by the respondents.
Results: It was discovered that farmers were aware of 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 adoption of soil health card recommendations is that the information on Soil Health Card is not in 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 Farmers training on use of Soil Health Card by calculating recommended dose of fertilizers and the information on Soil Health Card should be in 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 [6] and, ultimately, how to avoid their loss or degradation, determines 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 fundamental [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 [11]. 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 [5]. Soil is a vital aid with numerous ecological features and socioeconomic contributions. It is largely a non-renewable aid with doubtlessly speedy degradation charges and extraordinarily low formation and regeneration processes. However, abuse and mismanagement are threatened by increasing demands for inconsistent use and eroding sustainability [3]. It holds five interconnected

services besides moderating the water cycle, namely, it provides physical support to the seeds by, supplies and retains 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, soil is a key factor in the regulation of elemental cycles [8]. 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 [9]. However, due to extremely poor coverage and a delay in timely distribution of fertilizer recommendations to farmers, India's soil health card program has failed to have the desired influence on the farming community [12]. 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 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 socioeconomic 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 adoption of 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 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 per cent position using the formula:

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

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 [4]. 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 rank 1,2,3 etc., in the descending order of the mean scores.

3. RESULTS AND DISCUSSION

Government is taking several promoting and conservative measures such as recommending soil test-based recommendations through collective use of both inorganic and organic sources of nutrient management to sustain better soil health and increased crop productivity [7]. Socioeconomic profile of the respondents was enlisted in the below Table 1 and Figures 1a to 1h. The details on age wise distribution of sample respondents are presented in Figure1a, in which they are classified under four categories viz., less than 35 years, 36-45 years, 46-55 years and above 55 years.

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

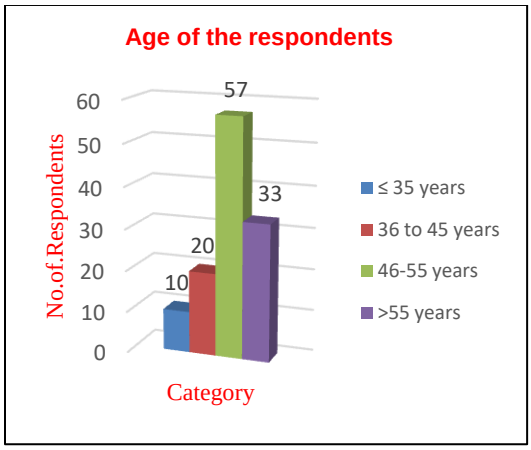
S. No.	Particulars	Category	Number of farmers	Total Number of Farmers
1.	Age	≤ 35 years	10 (08.33)	120 (100.00)
		36 to 45 years	20 (16.67)	
		46-55 years	57 (47.50)	
		>55 years	33 (27.50)	
2.	Education	Illiterate	17 (14.18)	120 (100.00)
		Primary	37 (30.83)	
		Secondary	35 (29.16)	
		Graduate and above	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.	Land holding	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)

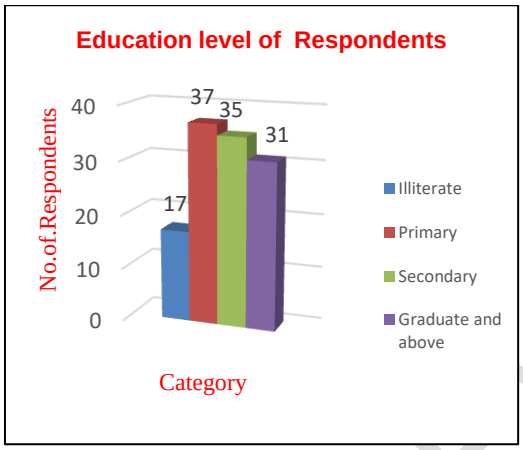
From the Table 1 and Figure 1a, results showed that in selected respondents, 57 farmers (47.50 per cent of the farmers) fall in the age group between 46 to 55 years followed by 33 farmers (27.50 per cent) in the age group of more than 55 years, 20 farmers (16.67 per cent) were between 36 to 45 years and 10 farmers (08.33 per cent) falls under the category less than 35 years. The respondents educational qualifications have a significant impact on the adoption of any technology. In the Figure 1b the selected farmers were classified into four groups as illiterate, primary education, secondary education and graduation and it is revealed that in the overall respondents per cent had completed their higher

secondary education followed by primary school educated (31.70 per cent), college education (23.30 per cent) and illiterates (11.70 per cent). These findings are more or less line with the findings of the past study [1] and its results reveals that the majority of farmers (60.83 per cent) are between the ages of 40 and 50, while 26.67 per cent are over the age of 50. The majority of the farmers (39.17 per cent) had completed primary school, while 29.17 percent had completed secondary school.

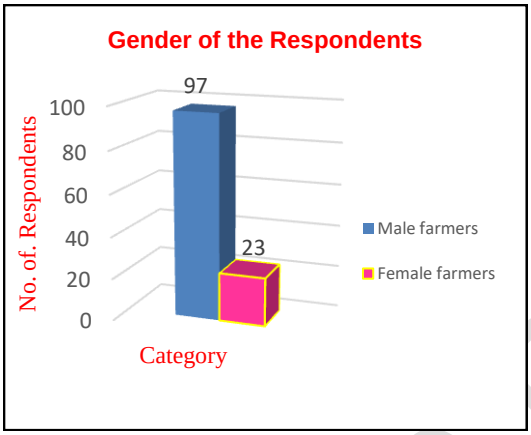
Figure 1 (1a to 1h): The socio-economic profile of the respondents



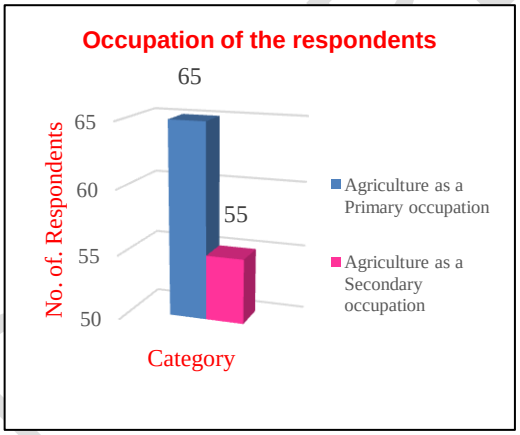
1a. Age of the respondents



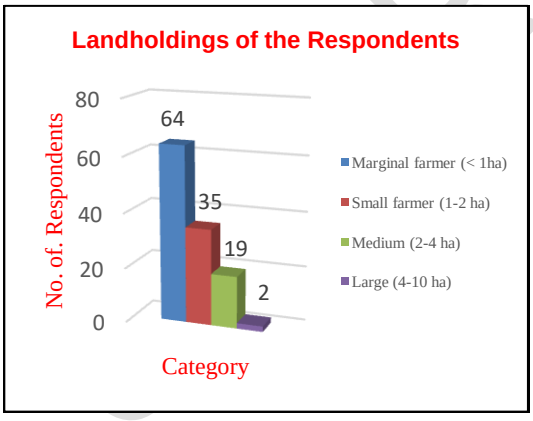
1b. Education level of respondents



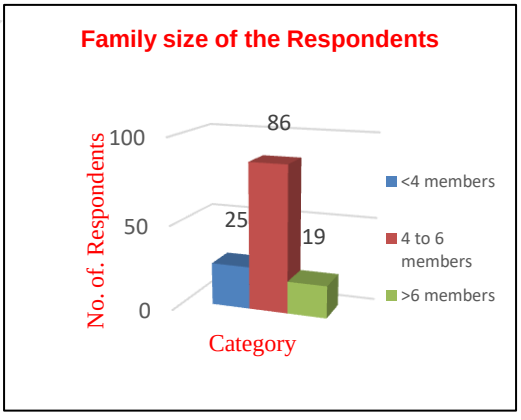
1c. Gender of the Respondents



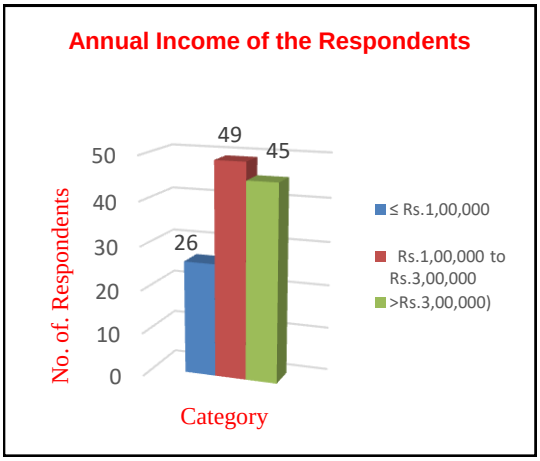
1d. Occupation of the respondents



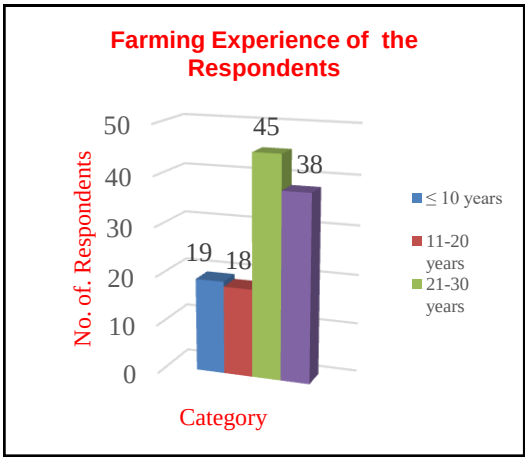
1e. Landholdings of the Respondents



1f. Family size of the Respondents



1g. Annual Income of the Respondents



1h. Farming Experience of the Respondents

Figure 1c depicts that among the respondents, 97 farmers were male and 23 were female. From Figure 1d, Among the selected respondents, 65 farmers (54.17 per cent of the farmers) in Karaikal considered agriculture as main stay and the rest were doing agriculture as secondary occupation. The finding also confirmation with the past research finding [13] as male farmers were higher than female farmers and their primary occupation as agriculture in their study.

Figure 1e shows that among the selected farmers, 64 respondents (53.33 per cent) were marginal farmers, followed by 35 respondents (29.10 per cent) were small farmers, 19 respondents (15.83 per cent) were medium size farmers and 2 respondents (01.67) per cent were large farmers. The results of the past study [15] are more or less line with the present study findings and reveals that 32.5 per cent farmers were marginal and small, 47.92 per cent farmers were semi medium and medium and 35.83 per cent farmers leased land along with their own land). The size of the family has important implications with respect to 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 Figure 1f. The selected farmers were classified into three groups as 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 per cent) had less than four members, followed by 86 respondents (71.62 per cent) with 4 to 6 members and 19 respondents (07.50 per cent) had more than 6 family members. These findings are consistent with the results found in previous study [10].

In Figure 1g, Majority of the respondents (49 respondents,40.83 per cent) falls under category Rs.1,00,000 to Rs.3,00,000 of Annual income similar results were obtained in the study [15] reveals that major proportion, 64 per cent farmers had income between Rs 2-8 lakh and only few farmers (2.92 per cent) 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 farming of the sample farmers is given in Table 1 and Figure 1h. The farming years of experience was grouped as less than 10 years, 11-20 years, 21-30 years and more than 30 years. From the Table 1 and Figure 1h, it could be observed that 45 respondents (37.50 per cent of the respondents) had farming experience of 21 to 30 years followed by 38 respondents (31.67 per cent) with more than 30 years of experience, 19 respondents (15.83 per cent) with less than 10 years of experience and 18 respondents (15.00 per cent) had11 to 20 years of experience. Majority of the farmers (51.67 per cent) had more than 21 years of farming experience [15].

Table 2: Awareness about soil health card information and its Recommendations(n=120)

S. No.	Awareness about soil health card 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 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)

From the Table 2, It was found that majority of sample respondents (62.50 per cent) were aware about 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 per cent). In further investigation majority of respondents (68.33 per cent) were aware that Soil health card gives the status of primary and secondary nutrients in the soil of particular field, major portion of the farmers (73.33 per cent) in the study area were aware about 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 line with the findings of [7] and reported that they are aware about SHC scheme (63.30 per cent).

It was observed that Most of the farmers (82.50 per cent) were aware that Soil health card guidance is principle based “right time right quantity and right amount”. Similarly, the proportion of 83.33 per cent of the total respondents were aware of Soil health card gives efficient outcome when its recommendations were regularly followed. 85.83 per cent of the respondents were aware that Soil health card guides farmers to know the excessive usage of fertilizers. The study was supported by previous study [14] who reported that the majority of farmers (95 per cent) 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 per cent). Further investigation revealed that the majority of farmers (88 per cent) 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 per cent) 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. In their study [13] discovered that the majority of farmers (79.17 per cent) were aware of the utility of the Soil Health Card.

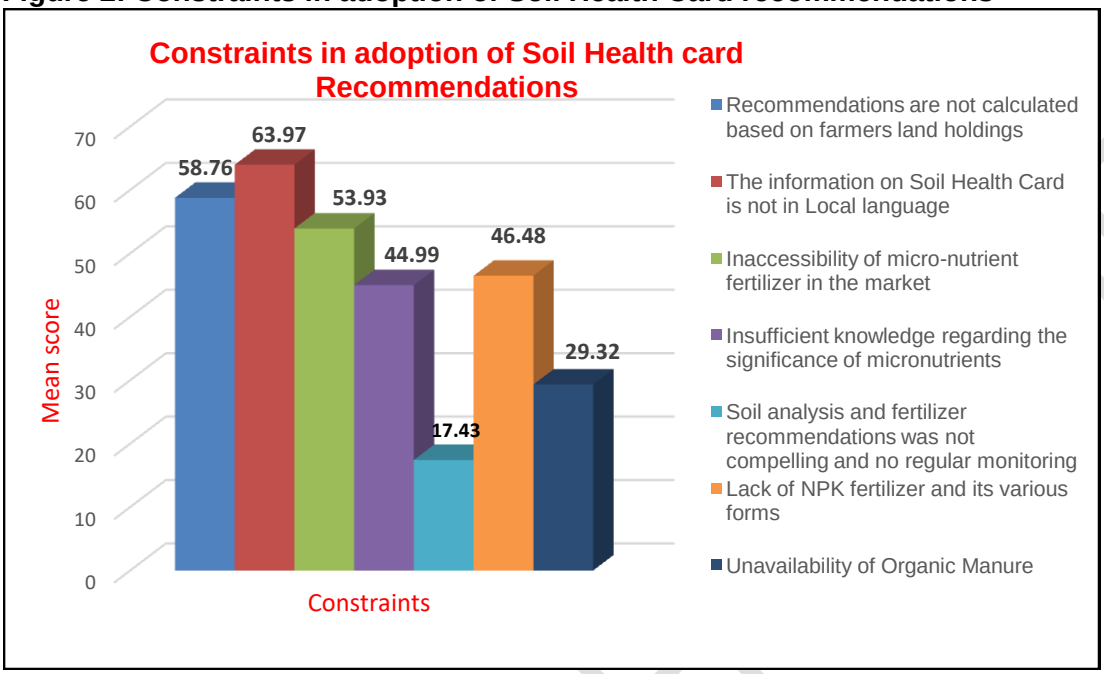
The constraints reported by the respondents while in adopting soil health card recommendations are recommendations are not calculated based on farmers land holdings, the information on soil health card is not in local language, inaccessibility of micro-nutrient fertilizer in the market, insufficient 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 the Table 2 and Figure 2. Among the constraints listed out by the sample respondents, the information on soil health card is not in local language is ranked as most important constraint with rank first; recommendations are not calculated based on farmers land holdings followed next. Inaccessibility of micro-nutrient fertilizer in the market ranked as third constraint. Soil analysis and fertilizer recommendations was not compelling and no regular monitoring ranked last as less important constraint. There are some past studies [1] which 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 is too long (82.8 per cent), a lack of proper scientific guidance (72 per cent), fertilizer prices that are too high (63.6 per cent), a lack of soil amendments such as bio-fertilizers and organic manure (56.4 per cent), and a lack of micronutrient fertilizers in the market (49.2 per cent). Similar study [15] 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. Farmers 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 meager level of benefits. Similar study [16] on examination of the constraints faced by farmers in Rajasthan's Sri Ganganagar district concluded that the respondents most significant constraints to implementing the Soil Health card scheme were lack of understanding about the need of 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 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 was 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)

Figure 2: Constraints in adoption of Soil Health Card recommendations



Source: Primary Survey (2021)

4. CONCLUSION

In this survey, it can be concluded that majority of the sample respondent from 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 about its utility and importance. The majority of farmers facing problem in adoption of soil health card recommendations is that the information on Soil Health Card is not in local language, recommendations are not calculated based on farmers land holdings, 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 card should be are available in the local language and provide subsidies to low-cost methods to produce organic manures by farmers in small-scale level.

REFERENCES

1. Archana, S. S., and R. Balasubramanian. "Awareness, knowledge and attitude of farmers towards soil health card schemes in Tamil Nadu." *International Journal of Agriculture Sciences* 11.9 (2019): 8405-8407.
2. Barbera, Marcella, and Giovanni Gurnari. *Wastewater treatment and reuse in the food industry*. Cham: Springer International Publishing, 2018.
3. Barrow, Christopher J. *Developing the environment: Problems & management*. Routledge, 2014.
4. Dhanavandan, S. "Application of garret ranking technique: practical approach." *International Journal of Library and Information Studies* 6.3 (2016): 135-140.
5. Farber, Brianna. *Ground Truthing: The Politics And Culture Of Soil And Water Conservation In Iowa Agriculture*. Diss. University of South Carolina, 2018.
6. Montgomery, D. R.. Dirt: The erosion of civilizations, Univ of California press. (2012)

7. Niranjan HK, Chouhan RS, Sharma HO, Rathi D. Awareness and performance of soil health card scheme in central India. Journal of Crop and Weed. 2018;14(1):99-103.
8. Oliver, Tom H., et al. "Biodiversity and resilience of ecosystem functions." *Trends in ecology & evolution* 30.11 (2015): 673-684.
9. Patel, N.. "Attitude of farmers towards soil health card programme." M. Sc.(Agri). (2013)
10. Patel, G. G., Lakum, Y. C., Mishra, A., & Bhatt, J. H. "Awareness and knowledge regarding soil testing and utility perception of Soil Health Card." *International Journal of Current Microbiology and Applied Sciences* 6.10 (2017): 329-334
11. Pekdemir, Sevgim. *Development of sustainable cities by using circular economy: Circular cities*. Diss. Politecnico di Torino, 2021.
12. Purakayastha, T. J., H. Pathak, Savita Kumari, Sunanda Biswas, Bidisha Chakrabarty, R. N. Padaria, Kalpana Kamble, Maneesh Pandey, Subodh Sasmal, and Anjali Singh. "Soil health card development for efficient soil management in Haryana, India." *Soil and Tillage Research* 191 (2019): 294-305.
13. Jaiswal, Monika, and Ajeet Singh. "Study on awareness & perception regarding soil health card." *Journal of Pharmacognosy and Phytochemistry. SP (4)* (2018): 395-400.
14. Kumar, Sunil, Pandurang A. Kale, and Pratibha B. Thombare. "Awareness about Soil Health Card and Constraints faced by Farmers in Utilising its Information in Southern Maharashtra." *Indian Journal of Extension Education* 55.3 (2019): 173-176.
15. Sunaina, Babita Kumar, and Gagandeep Banga. "An Empirical Investigation of Farmer's Perception and Attitude Towards Soil Health Testing in Punjab." *Journal of Agricultural Development and Policy* 28.1 (2018): 81-91.
16. Sheetal, Manmeet Kaur, and Diksha Sharma. "Constraints Faced by the Farmers in Adoption of Soil Health Card Scheme." *Int. J. Curr. Microbiol. App. Sci* 9.9 (2020): 100-108.