Research Article

AWARENESS, KNOWLEDGE AND ATTITUDE OF FARMERS TOWARDS SOIL HEALTH CARD SCHEME IN TAMIL NADU

ARCHANA S.S.[1] AND BALASUBRAMANIAN R.*[2]

[1]Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 641003, Tamil Nadu, India
[2]Agricultural College and Research Institute, Thiruvannamalai, Tamil Nadu Agricultural University, Coimbatore, 606753, Tamil Nadu, India
*Corresponding Author: Email - rubalu@gmail.com

Abstract: The government of India is investing in a large-scale, expensive program of individualized soil testing and customized fertilizer recommendations, with the hope that scientific information will lead farmers to optimize the fertilizer mix. The Soil Health Card is a printed report that a farmer will be handed over for each of his holdings. It will indicate the fertilizer recommendations and the soil amendments required for each farm. It shows optimum combinations of nutrients required for each crop along with the details of various parameters of the soil being tested. The present study was undertaken in Dharmapuri and Krishnagiri Districts of Tamil Nadu to analyse the level of awareness and knowledge of the farmers regarding the Soil Health Card scheme. The primary data for the study at micro level was collected by survey method adopting personal interview of the selected respondents with the help of well-structured and pre-tested questionnaire. It is found that that nearly 3/4th of the sample respondents are aware of this scheme and more than 50 percent of the farmers have medium level of knowledge regarding the utility and importance of this scheme. The information was disseminated mostly through neighbours and friends. It is also found that maximum number of farmers in both the districts of Tamil Nadu have moderately favorable attitude towards this scheme. Knowledge level was found to be the highly significant factor influencing the adoption of the soil test based recommendations by the farmers.

Keywords: Soil Health Card, Awareness, Knowledge, Attitude

Introduction

The Indian Fertilizer Industry has shown tremendous growth in the last five decades and at present ranks third in the world. India is the second largest consumer of fertilizers after China. India also ranks second in the production of nitrogenous fertilizers and third in phosphatic fertilizers whereas the requirement of potash is met through imports since there are limited reserves of potash in the country. According to the Food and Agriculture report world demand for total fertilizer nutrients is estimated to grow at 1.8 percent per annum from 2014 to 2018. The demand for nitrogenous, phosphatic, and potash is forecasted to grow annually by 1.4, 2.2, and 2.6 percent, respectively, during the period. Farmers' application of fertilizers is often based on blanket and a uniform, crop-based recommendation without an in-depth understanding of the nutritional status of their soils which warrants periodic testing of soils so as to devise scientific fertilizer recommendation. The blanket application of fertilizers without a scientific basis of actual requirements based on soil tests has led to under-use and/or over-use of fertilizers resulting in imbalanced nutrient application. While food grain production increased significantly during the same time period, the increase in total food grain production failed to keep pace with the dramatic increases in fertilizer application, resulting in low and deteriorating fertilizer use efficiency. The unbalanced application of chemical fertilizers in India is the reason for low yields, poor soil quality, contamination of water resources, and enormous public expenditures on subsidies. In order to overcome the issue, Soil Health Card scheme is promoted by the Department of Agriculture & Co-operation under the Ministry of Agriculture and Farmers' Welfare, GoI. SHC gives the soil nutrient status of each farm and suggest on the dosage of fertilizers and also the needed soil amendments that one should apply to maintain soil health in the long run. At a total program cost of Rs. 568 crore (that is, Rs 5.68 billion, roughly equivalent to US$85 million at prevailing exchange rates at the time), the program promises to conduct individualized laboratory tests of soil composition for each farmer's land and provide a detailed analysis of the availability of various nutrients and other compounds in the soil as well as recommendations for fertilizer application based on a target yield. SHC is a printed report that a farmer will be handed over for each of his holdings. It contains the following 12 parameters, namely N, P, K (Macro-nutrients); S (Secondary- nutrient); Bo, Mn, Zn, Fe, Cu (Micro - nutrients); and EC, pH, OC (Physical parameters). Based on this, the SHC will also indicate fertilizer recommendations and soil amendment required for the farm. It will show recommendations on dosage of different nutrients needed. This soil health card programme brings together the scientific community in the field of agriculture, the information repository of latest tool, techniques and cropping practices, the farmers and the Government for the economics upliftment of the people at large. Since, change in knowledge preceded acceptance and application of an innovation, it is therefore, always important to find out the factor responsible for positive or negative disposition associated with farmer toward the usefulness and application of soil health card programme. The decision to participate in new agricultural technologies depends on farmer's perception which is a key determinant in influencing adoption [1]. Technology adoption is also influenced by perceived profitability, costs of the technology and clarity at which the new knowledge and information is communicated in a recipient population [2]. Since Knowledge, awareness and attitude are the prerequisite for the adoption of any new technology; the study is conducted with the following objectives:

1. To understand the awareness, knowledge and attitude of the farmers towards the scheme;
2. To study the factors influencing the adoption behavior of the individuals;
3. To identify the constraints faced by the farmers in adoption of SHC recommendations.

Materials and methods

The present study was undertaken in Dharmapuri and Krishnagiri Districts of Tamil Nadu. The study is based on both primary and secondary data. A comprehensive list of all the respondents having Soil Health Cards was obtained from the District Agricultural Office of each district. The total sample size is 120 farmers, out of which 60 respondents (30 beneficiaries and 30 non-beneficiaries) were selected from each district by employing random sampling method. The primary data for the study at farm level was collected by household survey method adopting personal interview of the selected respondents with the help of well-structured and pre-tested questionnaire. The Garrette's ranking technique was used to identify the constraints in adoption of soil health card scheme [3]. The logit model was used to study the adoption behavior of respondents. The logistic model, which is based on cumulative logistic probability functions, was developed to analyze the adoption characteristics of farmers based on soil test based fertilizer recommendations [4].

The general model of adoption is

$$P_i = f(B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + U_i)$$

The variables definition and measurement is shown below.

Dependent variable

Y_i = Farmers adoption decision: 1 if adopted and 0 otherwise

Independent variables

X_1 = Age of the farmer (years)

X_2 = Farmer's education level (years)

X_3 = Farm size (ha)

X_4 = Farming experience (years)

X_5 = Access to extension visits (1=yes, 0=otherwise)

X_6 = Knowledge about SHC scheme (1=yes, 0 = otherwise)

X_7= Exposure to mass media (1=yes, 0 = otherwise)

U_i= Error term

Results and discussion

Socio Economic Profile of the Sample Respondents

The farmer's personal profile is directly or indirectly related with the family profile and suggests the positive chances of adoption of the technology. The result shows that, majority of the farmers lies in the age group of 40 to 50 (60.83 percent) and 26.67 percent of the farmers lies above the age 50 [Table-1]. In the study area, nearly 55.83 percent of the farmers had small (2.5 to 5 acres) operational land holdings and 19.17 percent of the farmers had marginal land holdings i.e. less than 2.5 acres. The educational qualification of the respondents has high influence in the adoption of any technology. Majority of the farmers had primary schooling (39.17 percent), and 29.17 percent of the farmers had secondary schooling. In the study area, majority (81.67 percent) of the farmers had 10 to 20 years of farming experience. About 68.33 percent of the farmers in the study districts depend on Agriculture to meet out their basic needs followed by 14.17 and 10 percent of the farmers working under Private and Government sectors respectively.

Awareness and Knowledge

Selection of innovation is the choice to utilize another thought as the best game-plan accessible and includes an adjustment in the introduction and conduct of the rancher from the time he/she winds up mindful of the innovation to its appropriation. The overall awareness and knowledge of the farmers in the study area regarding the soil health card scheme and its utility are presented in [Table-2]. The results show that majority (74.17 percent) of the farmers in Tamil Nadu had awareness about the scheme. Only 25.83 percent of the farmers were not aware about the scheme. Similarly, it is clear that 56.67 percent of the farmers had medium level of knowledge followed by 35 percent of farmers with low level of knowledge regarding the benefits and utility of the scheme. Only 8.33 percent of the farmers had higher level of knowledge about this scheme.

Source of Information

There are several sources which plays a significant role in making the farmers aware of the benefits of the Soil health card scheme. The data regarding the sources of information for farmers about the soil health scheme are provided in [Table-3]. Friends and relatives provided the information to majority of the beneficiaries (50percent) and non-beneficiaries (75percent). Relative's contribution in the dissemination of information is about 25 percent to beneficiaries and 16.67 percent to non-beneficiaries. Only 16.67 percent of the soil tested farmers were provided the information by the Agriculture department.

Table-1 Demographic Characteristics of the Sample Respondents, (N=120)

SN	Characteristics	Category	Number of Farmers	Percentage
1	Age (In Years)	Less than 40	15	12.5
		40 to 50	73	60.83
		Above 50	32	26.67
2	Land holdings (In Acres)	Marginal (less than 2.5)	23	19.17
		Small (2.5 to 5)	67	55.83
		Big (more than 5)	30	25
3	Education	Illiterate	7	5.83
		Primary	47	39.17
		Secondary	35	29.17
		Higher secondary	17	14.17
		Degree	14	11.66
4	Farming experience (In Years)	< 10	12	10
		10 to 20	98	81.67
		> 20	10	8.33
5	Occupation	Agriculture	82	68.33
		Private	17	14.17
		Government	12	10
		Business	9	7.5

Table-2 *Response of the Farmers Regarding the Utility of the Scheme*

SN	Response/ Category	No of Respondents	Percentage
Awareness			
1	Yes	89	74.17
2	No	31	25.83
	Total	120	100
Knowledge level			
1	Low (<3)	42	35
2	Medium (3-7)	68	56.67
3	High (>7)	10	8.33
	Total	120	100

Table-3 *Source of Information about the Scheme*

SN	Source	Beneficiaries	Non Beneficiaries
1	Friends/Neighbours	30(50.00)	45(75.00)
2	Relatives	15(25.00)	10(16.67)
3	Media	5(8.33)	0
4	Agricultural Officers	10(16.67)	5(8.33)
5	KVKs	0	0
6	Others	0	0
	Total	60(100.00)	60(100.00)

Attitude towards Soil Health Card Scheme

In the present study, the data pertaining to statement- wise responses of the farmers towards soil health card programme were collected in five continuums of totally 12 statements and results are depicted in the [Table-4]. It shows that majority of the beneficiaries in Dharmapuri (66.67 percent) and those in Krishnagiri (40.00 percent) districts have moderately favourable attitude towards this scheme. Only 23.33 percent and 33.33 percent of the farmers have highly favourable attitude in Dharmapuri and Krishnagiri districts respectively. Patel *et al.,* (2017) [5] also found that more than two-thirds (67 percent) of the respondents had high level of satisfaction on SHC recommendations.

Table-4 *Distribution of the Respondents According to their Attitude towards SHC Programme*

SN	Category	Dharmapuri	Krishnagiri
1	Less favorable (up to 35 score)	3(10.00)	8(26.67)
2	Moderately Favorable (35 to 41 score)	20(66.67)	12(40.00)
3	Most favorable (above 45 score)	7(23.33)	10(33.33)
	Total	30(100.00)	30(100.00)

Factors influencing adoption

The factors influencing the adoption of Soil test based recommendations by the sample farmers were identified using Logit Regression Model and the results are presented in [Table-5].

Table-5 *Factors influencing the adoption of Soil test based recommendations – Estimates of Logit Function*

SN	Variables	Coefficient	Standard Error
1	Age of the farmer (X_1)	-0.194 NS	0.141
2	Education status (X_2)	0.310*	0.172
3	Farm size (X_3)	1.006**	0.453
4	Farming experience (X_4)	-0.953**	0.439
5	Access to extension visits (X_5)	2.430 NS	1.561
6	Knowledge about SHC scheme (X_6)	2.795***	0.892
7	Exposure to mass media (X_7)	2.515 NS	1.783
8	Constant	3.087	6.175

NS- Non significant, Pseudo R-square = 0.88, (***Significant at 1 percent level, **Significant at 5 percent level, *Significant at 10 percent level)

The result indicated that education status, farm size, farming experience and knowledge regarding the scheme were the significant factors influencing the adoption of the Soil Health Card Scheme. The analysis revealed that literacy level, size of operational land holdings and knowledge level were significant and had a positive relation with the probability of adoption of the scheme. Farming experience was significant and has a negative relation with the adoption of the scheme. It is seen that when experience in farming is high people tend to have no reliability over the soil test based recommendations. Among the variables, the overall knowledge regarding the benefits of the scheme is found to have a positive and highly significant contribution at one percent level of significance. A unit increase, ceteris paribus, in variables namely Education status (X_2), Farm size (X_3) and Knowledge level (X_6) would increase the level of adoption of Soil Health Card Scheme by 0.310,1.006 and 2.795 units respectively.

Table-6 Distribution of the Respondents according to the Constraints Faced by them in the Utilization of Soil Health Card Programme

SN	Problems faced in the adoption of SHC scheme	Garette Score	Garette Ranking
1	Inability to understand all the information given in the card	96	I
2	Prices of fertilizers are high	63.6	IV
3	Time gap between soil samples taken and issuing cards is too high	82.8	II
4	Non availability of organic manure and bio-fertilizers	56.4	V
5	No certainty in yield gain	38.4	VII
6	Lack of proper scientific guidance	72	III
7	Non availability of micronutrient fertilizers in market	49.2	VI

Constraints faced by the farmers

In the present study, some constrains faced by farmers in application of soil test based recommendations were also studied. In this regard the data were given in the above [Table-5]. It can be seen that inability to understand all the information given in the card was the first constraint with the mean score 96 percent followed by time gap between soil samples taken and issuing cards is too high (82.8 percent), lack of proper scientific guidance (72 percent), prices of fertilizers are high (63.6 percent), non-availability of organic manure and bio-fertilizers (56.4 percent) and non-availability of micronutrient fertilizers in market (49.2 percent).

Conclusion

The study on the farmer's knowledge and awareness towards the Soil health card scheme can be concluded that nearly three-fourth of the sample respondents are aware of this scheme and more than 50 percent of the farmers have medium level of knowledge regarding the utility and importance of this scheme. The information was disseminated mostly through neighbours and friends. It is also found that maximum number of farmers in both the districts have moderately favourable attitude towards this scheme. Knowledge level regarding the scheme was found to be the highly significant factor influencing the adoption of the soil test based recommendations by the farmers. Though majority of the farmers are literate,

difficulty in understanding the contents of the soil health card seems to be the major constraint followed by improper timely distribution of the cards, lack of scientific guidance and high price of fertilizers. Therefore, as suggested by the farmers, more trainings and facilities are required to disseminate the technology at large scale. Extension workers can take their lead in this to overcome the barriers in adoption of the technology.

Application of research: Study of crop-wise fertilizer recommendations for all major crops cultivated in the districts shall be provided to the farmers along with the soil health cards.

Research Category: Agricultural Economics

Abbreviations: SHC: Soil Health Card, GoI: Government of India, N: Nitrogen, P: Phosphorus, K: Potassium, S: Sulphur, B: Boron, Mn: Manganese, Zn: Zinc, Cu: Copper, Fe: Iron, EC: Electrical conductivity, OC: Organic carbon.

Author Contributions: All authors equally contributed
Author statement: All authors read, reviewed, agreed and approved the final manuscript. Note-All authors agreed that- Written informed consent was obtained from all participants prior to publish / enrolment

Study area / Sample Collection: Dharmapuri, Krishnagiri Districts of Tamil Nadu
Cultivar / Variety name: Nil

Conflict of Interest: None declared
Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.
Ethical Committee Approval Number: Nil

Reference

[1] Akinwumi A. Adesina and Jojo Baidu-Forson (1995) *Agricultural Economics*, 131-9.
[2] Boahene K., Snijders T.A.B. and Folmer H. (1999) *Journal of Policy Model*, 21, 167-184.
[3] Garett H.E. and Woodworth R.S. (1969) *Statistics in psychology and education. Vakils, Feffer and Simons Pvt. Ltd., Bombay*, 329.
[4] Adeogun O.A., Ajana A.M, Ayinla O.A., Yarhere M.T. and Adeogun M.O. (2008) *American-Eurasian Journal of Agricultural & Environmental Science*, 4 (4), 468-472.
[5] Patel G.G, Lakum Y.C., Aakash Mishra and Bhatt J.H. (2017) *International Journal of Current Microbiology and Applied Sciences*, 6(10), 329-334.
[6] Patel J.K. and Chauhan N.B. (2011) *Proceedings of the 7th Agresco subcommittee meeting of social science group, Anand Agricultural Awareness, Knowledge and Attitude of Farmers towards Soil Health Card Scheme in Tamil Nadu University, Anand*, 12.
[7] Rai and Singh (2008) *Indian Research Journal of Extension Education*, 8, 89-91.
[8] Patel M.C. and Chauhan N.B. (2004) *Gujarat J. Extn. Edu.*, 15, 5- 8.
[9] Srivastava Y.C. & Pandey A.P. (1999) *Agricultural Extension Review*, 11(6), 3-6.
[10] Patel J.K. and Chauhan N.B. (2012) *Asian Journal of Soil Science*, 7 (1), 114-116.
[11] Yadav V.P.S., Raman R.S. & Kumar R. (2006) *Indian Research Journal of Extension Education*, 6, 3.