

Original Research Article

Impact Assessment on adoption of Soil Health Cards for Fertilizer Management in Tiruvallur District

ABSTRACT

Soil Health plays a vital role to ensure agricultural production in a sustainable manner. The basic objective of the soil testing is to provide recommendations to the farmers for the optimum and economic use of fertilizers and better soil management practices to increase agricultural production in their farm. The present study was conducted to analyze the adoption of soil testing and Soil Health Cards for fertilizer management conducted by Krishi Vigyan Kendra (KVK), Tirur, Tiruvallur district. The data revealed that the number of conduct of awareness and training programmes on soil health management and soil samples analyzed (30 nos. to 240 nos.) at KVK Tirur increased from 2012 to 2018. Results indicated that highest percentage of beneficiaries belonged to the middle age group of 36-55 years (48.75%) followed old age (37%). Most of the farmers were practicing agriculture in Semi Medium (28%) followed by medium land holdings (24%) among the SHC beneficiaries and small (35%) and Marginal land holdings (30%) among non-SHC beneficiaries. It was observed that medium level of knowledge was obtained (48%) by SHC beneficiaries followed by high level (20%) whereas 60% of non-beneficiary was having low level of knowledge on SHC. On an average majority of the SHC beneficiary were lying in the medium adoption level (43%) followed by high adoption category (21%). Reason behind the partial adoption and no adoption might be due to their unawareness on the benefits of optimum fertilizer application. Comparative analysis between adopted beneficiaries and SHC non-beneficiaries on crop productivity in paddy, Greengram Blackgram and groundnut indicated 11.66%, 16.12%, 8.67 and 15.10% increase in productivity over non-beneficiaries.

Keywords: Soil testing, SHC adoption, Impact assessment, Tiruvallur, Tamilnadu

1. INTRODUCTION

Paddy is the principal crop extensively cultivated during three seasons, Sornavari (April to July), Samba (August to November) and Navarai (December to March) in Tiruvallur district. The agricultural production and productivity depends upon number of factor of which soil fertility plays an important role. Soil fertility is identified by the nutrient status of the soil. Soil testing is known as a precise management method for determining and assessing soil fertility that enables farmers to assess nutrient status and the impact of management and identify what changes are needed each year (Sali *et al.*, 2016). Deteriorating soil health in Indian agriculture has become a cause of concern, which has led to sub-optimal utilization of farm resources. Particularly, imbalanced use of fertilizers, affects the agricultural productivity (Rao Srinivasa *et al.* 2011). Soil testing is a gateway technology to the adoption of other precision-agriculture technologies, which is why disseminating information about advances in soil-testing strategies and how they are used is important. Central and State government have launched the Soil Health Cards (SHC) Scheme in February 2015.

A SHC is meant to give each farmer soil nutrient status of his holding and advise him on the dosage of fertilizers and micronutrient and also the needed soil amendments that he should apply to maintain soil health in the long run. The scheme is considered as a holistic measure for soil health and farm economy. A SHC carries crop wise recommendation of nutrients and fertilizer required for the individual farms to help farmers to improve productivity through judicious use of inputs. The types of soil, predominantly found in Tiruvallur district are red non calcareous and coastal alluvial. The soil found in the coastal region of Tiruvallur is of the erinaceous type (sandy), suitable for casuarina plants. The other soil types are sand and sandy loams which are found in all taluks with red loam in part of Tiruthani Taluk. Saline and alkaline soils are also noticed in some patches of Ambathur, Ponneri and Tiruvallur Division. In this study it was proposed to analyse role of extension and awareness programmes by KVK Tirur on Soil Health Management and to study the extent of adoption of nutrient management practices by the beneficiary farmers as recommended by the Soil Health Card for major crops in Tiruvallur district.

2. MATERIALS AND METHODS

The Mini Soil Testing Lab (*MRIDA PARIKSHAK*) developed by ICAR- Indian Institute of Soil Science, Bhopal in collaboration with Nagarjuna Agro-Chemicals (NAC) Pvt. Ltd., Hyderabad was established at Krishi Vigyan Kendra, Tirur, Tiruallur district during the year 2012. With the help of this Mini Lab, 15 parameters of a soil sample can be analyzed. During pre kharif and pre rabi seasons various extension programmes viz., awareness campaigns, trainings, demonstrations, exhibitions, farmers day etc., are being organized to farmers to motivate the farmers to go for soil testing periodically and apply fertilizers based on Decision Supporting System for Integrated Fertilizer Recommendation software developed by TNAU. Number of samples analysed at ICAR-KVK, Tirur from the year 2012 to 2018 were collected and taken for analysis. The study was conducted at Tiruvallur district, Tamil Nadu. From each block 20 Soil Health Card beneficiaries and 20 non-beneficiaries were randomly selected to constitute the sample size of 100 for the study. The response was taken out with the help of well developed semi-structured interview schedule. Independent variables viz., Age, Education, Land holding and Knowledge about SHC (Soil sampling and testing, General knowledge on SHC, Contents of SHC, Usefulness of SHC, Knowledge on Soil health and management (22 questions) and Knowledge Index was calculated); Dependent variable viz., Impact of SHC scheme on adoption of recommendations and the profitability of SHC farmers compared to non-beneficiary farmers. The data was analysed using descriptive statistics like frequency, simple percentage analysis and t-test was conducted to test the difference between beneficiary and non-beneficiary in adoption of SHC recommendations.

RESULTS AND DISCUSSION

The present study deals with the awareness programmes on soil health management conducted by KVK, Tiruvallur, independent and dependent variables and their impact on adoption level of recommendations by Soil health Cards. The data revealed that under the awareness programmes conducted by the KVK was 123 programmes from 2012 to 2019 (Table1). The results indicated that the number of soil sample analysis increased with the year from 30 numbers to 240 numbers. The reason behind this might be due to the conduct of series of awareness programmes for the benefit of farming community, which facilitated high extent of adoption of soil testing. The findings of present study are in accordance with the findings

reported by Yadav et al., (2006). Diraj (2014) reported that training is vital and essential to induce motivation, create confidence and increase the efficiency of farmer. It is a process by which desire, ideas, positive attitude, knowledge and skill are inculcated and reinforced. Morwal and Pagaria (2018) reported that the gain in knowledge depends on various factors like easiness of technologies, educational background of the participating farmers, extension approaches handled in technology transfer, farmers' attitude, ability of extension personnel, teaching and learning situation. Marenya and Barrett (2007) have reported that education level as one of the factors influencing adoption of Integrated Soil Fertility Management

Table 1. Details on Extension programme on Soil Health Management and Soil Analysis at KVK, Tirur, Tiruvallur

S.No	Year	No. of trainings	No. of Soil Samples analysed	No. of villages covered
1	2012-2013	26	30	12
2	2013-2014	23	87	55
3	2014-2015	12	85	48
4	2015-2016	11	nil	-
5	2016-2017	19	100	40
6	2017-2018	12	88	18
7	2018-2019	20	240	52
	Total	123	428	110

Independent Variables:

Independent variables *viz.*, Age, Education, Land holding and Knowledge about SHC were taken for analysis. The results indicated that highest percentage of beneficiaries belonged to the middle age group of 36-55 years. 37.5 % are old age group followed by 11% young age group in SHC beneficiary farmers (Table 2). More number of young and middle age group in non SHC beneficiary farmers may be concentrated to motivate and follow the Soil testing.

Table 2. Distribution of beneficiaries based on their age.

S.No	Age	SHC Beneficiaries (n=80)		SHC Non-Beneficiaries (n=20)	
		Frequency	Percentage	Frequency	Percentage

1	Young (<35 years)	11	13.75	5	25
2	Middle(36-55 Years)	39	48.75	8	40
3	Old (>55 years)	30	37.5	7	35

Results on the distribution of beneficiaries according to their education (Table3) revealed that 37.50% and 40% of SHC and Non-SHC beneficiaries had high school education. Subsequently middle school and Primary education were the major categories. The good education background of the respondents was observed which may be due to the presence of government schools.

Table 3. Distribution of beneficiaries based on their education (Scale by Supe, 2007)

S.No	Education	SHC Beneficiaries (n=80)		SHC Non-Beneficiaries (n=20)	
		Frequency	Percentage	Frequency	Percentage
1	Illeterate	4	5.00	-	-
2	Primary	13	16.25	4	20.00
3	Middle School	23	28.75	7	35.00
4	High School	30	37.50	8	40.00
5	Graduate	10	12.50	1	5.00

Most of the farmers selected in above blocks were practicing agriculture in Semi Medium (28%) followed by medium land holdings (24%) among the SHC beneficiaries (Table 4). While in non-SHC beneficiaries most of farmers are practicing agriculture in small (35%) and Marginal land holdings (30%). Hence small size land holdings may be a factor non-adoption of SHC technology.

Table 4. Distribution of beneficiaries according to their Land holding (Scale by Markad, 1996)

S.No	Education	SHC Beneficiaries (n=80)		SHC Non-Beneficiaries (n=20)	
		Frequency	Percentage	Frequency	Percentage
1	Marginal (upto 1.00Ha)	4	5.00	6	30.00
2	Small (1 to 2 Ha)	9	11.25	7	35.00
3	Semi-Medium	28	35.00	5	25.00

	(2 to 4 Ha)				
4	Medium (4 to 10 Ha)	24	30.00	2	10.00
5	Big (>10 Ha)	15	18.75	-	-

Analysis on knowledge gain and recorded that the medium level of knowledge was obtained (48%) by SHC beneficiaries followed by high level (20%) and low level (12%) whereas 60% of non-beneficiary was having low level of knowledge on SHC followed by medium (35%) and high (5%) (Table 4). Reason for more knowledge obtained by SHC beneficiaries might be due to their regular and periodical contact with the Agriculture department and also with the KVK of Tiruvallur district. Patel *et al* (2017) and Mukati (2016) reported that the SHC holders obtained high level of awareness on the utility of SHCs.

Table 5. Distribution of beneficiaries according to their overall Knowledge level on SHC

S.No	Education	SHC Beneficiaries (n=80)		SHC Non-Beneficiaries (n=20)	
		Frequency	Percentage	Frequency	Percentage
1	Low (33.33%)	12	15.00	12	60.00
2	Medium (33.34 to 66.66%)	48	60.00	7	35.00
3	High (>66.66%)	20	25.00	1	5.00

The extent of adoption of nutrient practices recommended by the SHC was categorized into full adoption (score2), partial (Score1) adoption and no adoption(Score 0) and Adoption index was calculated by Obtained score/Attainable score (6) * 100. In the analysis it was found that most of the farmers followed full adoption of macro nutrients (Urea, DAP and MOP) and not the micronutrients and organic manures. On overall basis majority of the SHC beneficiary (43%) were lying in the medium adoption level followed by 21% in the high adoption category (Table 6). Reason behind the partial adoption and no adoption might be due to their unawareness on the benefits of optimum fertilizer application.

Table 6. Distribution of beneficiaries according to their overall adoption level regarding SHC recommendations

S.No	Education	SHC Beneficiaries (n=80)	
		Frequency	Percentage
1	Low (37%)	16	20.00
2	Medium (37-68%)	43	53.75
3	High (>68%)	21	26.25

The results on the productivity of various crops grown by the SHC and non-SHC beneficiary indicated that the average yields of major crops viz., Paddy, Greengram, Blackgram and Groundnut in the fields of SHC beneficiary were 34.75, 3.60, 4.15 and 28.2 q/ha respectively whereas that of non-SHC beneficiary were 31.15, 3.10, 3.82 and 24.5 q/ha respectively . Maximum of 16.12% increase in productivity was observed for greengram crop followed by groundnut (15.10%), and Paddy (11.56%) (Table7). The t- test results showed that the SHC and non-SHC beneficiary differs significantly for Paddy, Greengram, Blackgram and groundnut productivity at 0.01 level of significance. The reason might be due to non adoption of proper fertilizer and pest management practices.

Table7. Average yield (Crop Productivity)of various crops grown by the beneficiaries

S.No	Crop	Average yield (q/ha)			% yield increase over non-beneficiary
		SHC Beneficiaries (n=80)	SHC Non-Beneficiaries (n=20)	t - value	
1	Paddy	34.75	31.15	7.2**	11.56
2	Greengram	3.60	3.10	4.85**	16.12
3	Blackgram	4.15	3.82	2.46**	8.63
4	Groundnut	28.2	24.5	5.70**	15.10

** Significant at $p < 0.01$

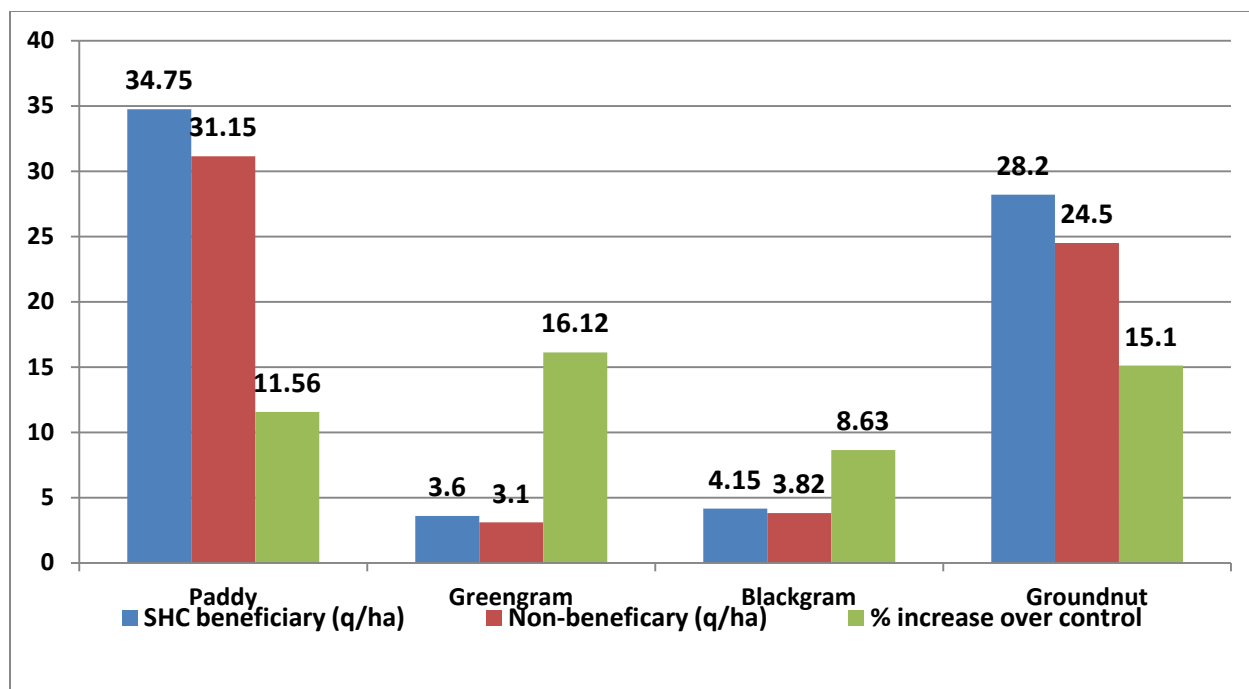


Fig. 1 t- test results showed that the SHC and non-SHC beneficiary differs significantly for Paddy, Greengram, Blackgram and groundnut productivity

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

References

1. Diraj, Premlata Singh. Effectiveness of training programmes under agricultural technology management agency in Bihar. *Indian Res. J. Ext. Edu.* 2014;14(1): 93-95.
2. Marenya PP and Barrett C B. 2007. Household-level Determinants of Adoption of Improved Natural Resources Management Practices among Smallholder Farmers in Western Kenya. *Food Policy*, 32: 515- 336.
3. Mohapatra, L and Kameshwari, V.L. 2014. Knowledge level of soil management practices and their adoption by farmers of Odisha. *Int. J. Farm Sciences.* 4 (4): 240-246.

4. Morwal BR, Pagaria Das. Impact of interventions on knowledge and adoption of improved technologies in Ber (*Ziziphus mauritiana*) Cultivation. *J Krishi Vigyan*. 2018;7(1) :140-143.
5. Patel,C.G., Lakumj, Y.C., Mishra, A., and Bhatt, J.H. 2017). Awareness knowledge regarding soil testing and utility perception on soil health card. *Int. J. Microbiology and Applied Sciences*, 6 (10) 329-334.
6. Rao Srinivasa, Venkateswarlu CH, Suhas Wani, Sreenath Dixit, Sahrawat, Sumanta Kundu. Benefits from micro and secondary nutrients: Impacts on farm income and livelihoods in rainfed tribal and backward regions of Andhra Pradesh, CRIDA and ICRISAT, Hyderabad; 2011.
7. Sali JR, Mokhale Padekarand, Rajput. 2016. Adoption of soil test recommendations by the farmers. *An Asian Journal of Soil Science*.11 (2): 358-360.
8. Yadav VP, Raman , Kumar . Knowledge and attitude of farmers towards soil testing practices. *Indian Res. J. Extn. Edu*. 2006;6 (3):1-3.