Original Research Article

Soil Health Card Adoption Behaviour of Farmers in Andhra Pradesh State of India

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A B S T R A C T

The Government of Andhra Pradesh had launched the Bhoochetana Project (Soil Testing Project) in 2010-11 for distributing Soil Health Cards (SHCs) to farmers to encourage judicious application of fertilizers and to maintain soil fertility. Therefore, a study was undertaken to evaluate the project in terms of knowledge level on Soil Health Management (SHM) among beneficiary farmers, extent of adoption of SHC recommendations by beneficiary farmers, and factors that determined the adoption of SHC recommendations. The study was conducted in Orvakal and Banaganapalli Blocks of Kurnool District of Andhra Pradesh state. Among the two Blocks, 100 farmers were selected, who formed the respondents of the study. It was found that a vast majority (83.00%) of the respondents had medium level of overall knowledge on SHM. Since the launch of the Bhoochetana project in 2010-11, 47 respondents had followed the SHC recommendations for all the five years. This is followed by nine respondents who had followed for four years, 21 respondents for three years, 14 respondents for two years, and the rest nine respondents for one year. Among adopters of SHC recommendations, cent per cent of the farmers had adopted the SHC recommendations as such without any deviation. Whereas, among non-Adopters of SHC recommendations, an overwhelming proportion (92.45%) of farmers fell under excess adoption category.The top five factors expressed by the respondents that determined use of SHC recommendations were to improve soil health, good for crops and increasing yields, extension functionaries of SDA, interest, and past experience.
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Introduction

Soil Health plays a vital role to ensure agricultural production in a sustainable manner. 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 fertilisers, low addition of organic matter and non-replacement of depleted micro and secondary nutrients over the years have resulted in nutrient deficiencies and decrease in soil fertility in many parts of the country. Especially, in rainfed regions of the country, declining soil fertility and nutrient imbalances are major

issues affecting agricultural productivity (Rao et.al, 2011). However, according to Yadav, et. al. (2006), knowledge level and adoption of Soil Fertility Management (SFM) practices are relatively less i.e. 65 per cent of farmers have no knowledge about SFM practices and just eight per cent of them have adopted SFM practices. Similarly, Srivastava and Pandey(1999) have reported that research studies reveal that most of the farmers are using continuously larger quantities of chemical fertilizers to increase production without knowing the fertility status of soils of their fields.

The basic objective of soil-testing is to give farmers a service leading to better and more economic use of fertilizers and better soil management practices for increasing agricultural production. Accordingly, the Government of Andhra Pradesh initiated the Bhoochetana Project (Soil Testing Project) in the year 2010-11 for distributing Soil Health Cards (SHCs) in order to encourage judicious application of fertilizers, to increase productivity of crops, and to maintain soil fertility.Soil samples were collected @ 10 samples per village from the farmers under this project, which were tested in the Soil Testing Labs,and based on which SHCs are distributed to the farmers.The SHC provides information mainly on Soil health condition, Package of practices suitable to soil type, and Inorganic & Organic fertilizer recommendations.

Therefore, a study was undertaken to evaluate the project with the following specific objectives:
To assess the knowledge level of farmers on Soil Health Management.
To analyze the adoption pattern of beneficiary farmers with respect to Soil Health Card recommendations.

To find out the factors determining the adoption of Soil Health Card recommendations by beneficiary farmers.

Materials and Methods

The study was conducted in Kurnool District of Andhra Pradesh state in India, since it has the highest net sown area under food crops among all the districts in Andhra Pradesh. Among the 54 Blocks in Kurnool District, Orvakal and Banaganapalli Blocks were selected for the study, based on maximum number of SHC holders, among all the Blocks. Further, among the 20 villages of Orvakal Block, 10 villages were selected, and of the 39 villages in Banaganapalli Block, 10 villages were selected for the study, based on simple random sampling. From the 20 villages, using proportionate random sampling method 100 farmers were selected, who formed the respondents of the study.

The Dependent Variables of the study were: Knowledge level on SHM, Pattern of adoption of SHC recommendations, and Factors that determined use of SHC recommendations. The survey was conducted with the help of a semi-structured and pre-tested interview schedule.

Results And Discussion

Profile Characteristics of Respondents

More than half (51.0%) of the respondents were found to be middle aged, followed by 28.0 per cent young aged, and the remaining 21.0 per cent were old aged. With respect to education, more than one-third of the respondents (39.00%) were educated upto middle level, followed by 28.00 per cent with higher secondary education, 17.00 per cent had collegiate education, and the rest (16.00%) had primary level of education.

Marenya and Barett (2007) have reported that educational level as one of the factors immensely influencing adoption of Integrated Soil Fertility Management (ISFM). The main reason for this is that ISFM practices are knowledge-intensive and thus require considerable management input.

As far as farm size was concerned, more than two-thirds (69.00%) of the respondents had medium level of farm size, followed by 19.00 per cent in high category, and the remaining 12.00 per cent of the respondents had low level of farm size. It was also found that that 40.00 per cent of the respondents were found between the income range of Rs.1,00,001- 2,00,000, followed by one-fourth (25.00%) with an income range between Rs.50,001-1,00,000, 17.00 per cent was found with Rs.2,00,001- 3,00,000, 10.00 per cent was found above Rs.3,00,000, and the rest (8.00%) were found in upto Rs.50,000 income category.According to Dutta (2009) and Sabo (2007), ownership of livestock contributes to wealth status, and wealthier farmers are likely to have more motivation to adopt ISFM, and to continue to seek for and access relevant information using various channels so as to cater for their information needs. With respect to contact with extension agency, about three-fourths (73.00%) of the respondents had medium level of contact with extension agency and other sources, and the rest (27.00%) had high level of contact with extension agency and other sources.

It was also found that three-fourths (75.00%) of the respondents had medium level of shared meaning on SHM, and the rest one-fourth (25.00%) had high level of shared meaning on SHM.Further, majority (60.0%) of the respondents had medium level of value attribution to SHC recommendations, followed by more than one-third (35.0%) with high level of value attribution, and the rest (5.0%) had low level of value attribution to SHC recommendations. Moreover, it was observed that half (50.00%) of the respondents had expressed that they would regularly follow the SHC recommendations in future, followed by 47.00 per cent who stated that they may or may not follow, and the rest (3.00%) fell under the may not follow category with respect to SHC recommendations.

Overall Knowledge

The distribution of farmer respondents according to their overall knowledge on SHM is given in Table 1.

From Table 1 it is seen that a vast majority (83.00%) of the respondents had medium level of overall knowledge on SHM, and the rest (17.00%) had high level of overall knowledge on SHM.All the respondents are seen to be distributed between medium to high categories with respect to overall knowledge on SHM. It was also found that among the SHM practices on which the respondents had less knowledge were 'green manure crops' (52.0%), 'tool for N recommendation in rice (Leaf Colour Chart)' (86.0%), and 'biofertilizers'(88.0%).Krishnakumar (1987) observed that majority of the adopters (63.34%) and non-adopters (66.67%) possessed medium level of knowledge on SoilConservation practices.Sathyanarayanan (1991) reported that most of the farmer respondents possessed medium level of knowledge on selected technologies such as Paiyur 1 rice variety, Potash top dressing, Enriched Farm Yard Manure, Azospirillum and Summerploughing.

Table.1 Distribution of Respondents according to Overall Knowledge on SHM

S.No.	Overall Knowledge categories	Per cent (n=100)
1.	Low (12-15 scores)	--
2.	Medium (16-19 scores)	83.00
3.	High (20-24 scores)	17.00
	Total	**100.00**
	Mean	19.84

Table.2 Distribution of Respondents according to years of adoption of SHC recommendations

S.No.	Years of Adoption	No. of Adopters (n=100)
3.	5 Years	47
4.	4 Years	9
5.	3 Years	21
6.	2 Years	14
7.	1 Year	9
	Total	**100**

Table.3 Distribution of Respondents according to Extent of Adoption of SHC recommendations

S.No.	Extent of Adoption Categories	Adopters of SHC recommendations (n= 47)		Non-Adopters of SHC recommendations (n= 53)	
		No.	Per cent	No.	Per cent
1.	Less adoption (-)	--	--	4	7.55
2.	Recommended Level of Adoption	47	100.00	--	--
3.	Excess adoption (+)	--	--	49	92.45
	Total	**47**	**100.00**	**53**	**100.00**

Table.4 Distribution of respondents according to Factors that determined use of SHC recommendations

S.No.	Factors	Per cent (n=100)
1. a.	**Personal** Past experience	55.00
b.	Knowledge	23.00
2. a.	**Psychological** Wise (Wisdom)	39.00
b.	Interest	61.00
c.	Conviction	29.00
d.	Scientific orientation	23.00
3. a.	**Physical** To improve soil health	80.00
b.	Availability of Family Labour	11.00
c.	Cattle ownership	32.00
4. a.	**Social** Neighbours / Friends	32.00
b.	Progressive Farmer	45.00
c.	Social recognition	12.00
5. a.	**Economic** Good for crops and increasing yields	78.00
b.	Less expensive	39.00
c.	Profitability	47.00
d.	Availability of bank loans	--
d.	Subsidy	--
6. a.	**Organizational** Extension functionaries of State Department of Agriculture (SDA)	66.00
b.	Input dealers	15.00
c.	Private firms	40.00

Table.5 Distribution of Respondents according to Suggestions offered by the respondents for enhancing adoption level of SHC recommendations

S.No.	Suggestions offered by Respondents	Per cent (n=100)
1.	Quick distribution of Soil Health Cards	96.00
2.	Follow-up by extension agency	84.00
3.	All farmers to be covered under the Bhoochetana project	71.00
4.	Conduct of more number of demonstrations	28.00
5.	Training on soil sampling and use of SHC	13.00
6.	Weekly once visit by AEO to the farmers' fields	6.00

Adoption Pattern

The adoption pattern of SHC recommendations was analysed in terms of years of adoption and extent of adoption of the recommendations. Table 2 indicates that out of the total five years of adoption period (which is the maximum period since the launch of the Bhoochetana project in 2010-11), 47 respondents had followed the SHC recommendations for all the five years. This is followed by nine respondents who had followed for four years, 21 respondents for three years, 14 respondents for two years, and the rest nine respondents for one year.

Nearly half of the respondents have adopted the SHC recommendations for the maximum period of 5 years, which may be as a result of the efforts taken under the Bhoochetana project. Discontinued adopters were to the tune of 53 per cent, who had followed the SHC recommendations for less number of years i.e., 4 and less. This finding may be due to the following reasons viz., inadequate follow-up by extension agency, no visible results, complex to adopt the recommendations, and less knowledge as expressed by a considerable proportion of the respondents as constraints faced in adoption of SHC recommendations.

Extent of Adoption

The results of the analysis of extent of adoption of SHC recommendations are presented in Table 3.

From Table 3 it is seen that among adopters of SHC recommendations, cent per cent of the farmers had adopted the SHC recommendations as such without any deviation. Whereas, among non-Adopters of SHC recommendations, an overwhelming proportion (92.45%) of farmers fell under excess adoption category, and the rest (7.55%) belonged to less adoption category. It is seen that a vast majority had applied excess quantity of inputs. On enquiry they reasoned that the recommendations are less reliable, exact usage of fertilizer recommendations is difficult, unscientific method of soil sample collection, recommendations not suitable for specific village conditions, expectations of high returns by applying more than recommended doses, and following neighbouring farmers in applying fertilizers.

Factors that Determined use of Soil Health Card (SHC) recommendations

The distribution of respondents according to factors that determined use of SHC recommendations is given in Table 4.

From Table 4 it is seen that with respect to Personal factors, past experience was the main factor for majority of the respondents (55.0%), and for 23.0 per cent knowledge was the factor that determined their adoption of SHC recommendations. In the case of Psychological factors, interest was the major determining factor for nearly two-thirds (61.0%) of the respondents, followed by wisdom (39.0%), conviction (29.0%) and scientific orientation (23.0%).

As far as Physical factors were concerned, more than three-fourths (80.0%) opined that to improve soil health as the determining factor, followed by cattle ownership (32.0%) and availability of family labour (11.0%). With respect to Social factors, about half (45.0%) of the respondents had mentioned progressive farmer as the reason for adoption of SHC recommendations, followed by neighbours / friends (32.0%) and social recognition (12.0%).

In the case of Economic factors, good for crops and increasing yields was the main determining factor for more than three-fourths (78.0%) of the respondents, followed by profitability (47.0%) and less expensive (39.0%). In respect of Organizational factors, extension functionaries of State Department of Agriculture was the major determining factor for about two-thirds (66.0%) of the respondents, followed by private firms (40.0%) and for the rest (15.0%) it was input dealers.

The top five factors expressed by the respondents that determined use of SHC recommendations were to improve soil health, good for crops and increasing yields, extension functionaries of SDA, interest, and past experience.

Suggestions to enhance adoption level of Soil Health Card (SHC) recommendations

The suggestions elicited from Farmers and Extension Functionaries so as to improve the adoption level of SHC recommendations are presented in this section.

Suggestions offered by Farmers

The distribution of respondents according to the suggestions given by farmers for improving the adoption level of SHC recommendations is presented in Table 5.

It is observed from Table 5 that the foremost suggestion expressed by the respondents was quick distribution of Soil Health Cards (96.0%), followed by follow-up by extension agency (84.0%), all farmers to be covered under the Bhoochetana project (71.0%), conduct of more number of demonstrations (28.0%), training on soil sampling and use of SHC (13.0%), and weekly once visit by AEO to the farmers' fields (6.0%).

Suggestions offered by Extension Functionaries

The suggestions offered by Extension Functionaries of SDA for increasing adoption level of SHC recommendations are as follows:

To create more awareness on benefits of SHC based recommendations.
Inclusion of SHM in school curriculum.
Distribution of Mobile soil testing kits.
To carry out GPS based soil testing.

Involving other line departments in collection of soil samples.
Involvement of higher officials of SDA

Majority (53.0%) had discontinued adoption of SHC recommendations during the five years, since inception of Bhoochetana project. For this reason, 'follow-up by extension agency' was one of the major suggestions offered by the respondents. This issue should be given top most priority by the SDA considering the time, energy, and money invested in the Bhoochetana project, so as to prevent discontinuance of adoption of the SHC recommendations. It is proposed that the SHC may be linked to GIS (Geographical Information System) maps of Andhra Pradesh and made available online. This would help the extension functionaries to provide site-specific agro advisories to the farmers. Considering the findings of this study, a separate Monitoring Cell can be thought-off by the State Department of Agriculture of Andhra Pradesh for establishing at the District level. The main functions of the Cell would be to educate farmers on SHM, and encourage them to adopt the SHC recommendations in a sustained manner.

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