RESEARCH ARTICLE :

Perception and adoption of soil health cards (SHCs) by the farmers in Kadapa district

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SUMMARY : To understand the perception and adoption levels of soil health card the present study was undertaken in three mandals (Vallur C K Dinne and Vontimitta) comprising of 60 soil testing based beneficiaries in Kadapa district of Andhra Pradesh. The findings of study revealed that majority of the farmers had medium level of perception (67%), followed by low (20%) and high level of perception (13%), respectively. Further results on the adoption levels of the selected respondents was that majority of the respondents (63.33%) had not adopted recommended organic manures as per SHC results, recommended nitrogen as per SHC results 85 per cent of the respondents not adopted, recommended phosphorus as per SHC results 91.67 per cent not adopted, recommended potash as per SHC results 90 per cent of the respondents not adopted, recommended micro nutrients as per SHC results 80 per cent of the respondents not adopted and recommended gypsum/lime as per SHC results 96.67 per cent of the respondents not adopted. Further results on the constraints, farmers feel that fertilizer dose is not sufficient if applied as per SHC result ranks first followed by difficult to understand and follow the recommended doses ranks second etc. The suggestion offered for the increase of soil health card adoption by the farmers were method of calculating the fertilizer dose on the basis of nutrient status of the soil should be given on SHC, training should be given on soil sample collection procedure and also its importance and contact number should be given in the SHC. With respect to the results on the reasons for non-adoption of soil health cards as perceived by the mandal agricultural officers is that not receiving timely soil health card to farmers ranks first followed by lack of awareness on the importance of soil testing ranks second and applying over doses of fertilizers by comparing with other farmers in the village ranks third etc.

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BACKGROUND AND OBJECTIVES

Soil is one of the elements required for farming as it provides nutrients to the plant. Soil health plays a vital role to ensure sustainable agricultural production. To popularizing soil test based fertilizer usages,

soil health card is a tool to help the farmer to monitor and improve soil health based on recommendations and enables the farmer to use the soil and crop specific fertilizers. It provides a qualitative assessment of soil health and reclamation measures to the problematic soil. To protect soil health and for sustainable

agriculture, the Government of India launched 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.Some of the studies revealed under taken on perception and adoption of soil health card revealed that Chowdary and Theodore (2016) found that among the 100 respondents it was also observed that majority of the farmers *i.e.* 53 of them did not follow the SHC recommendations, whereas they had followed their own dosages.The job of soil testing is done in soil testing labs and mini kit at KVKs across the country. In order to find out the perception and adoption levels of soil health cards a study was undertaken during December, 2019 with the following objectives:

– To study the perception and adoption of SHC

– To find out the deviations in adoption of SHC recommendations

– To find out the constraints and suggestions as perceived by the farmers

– To find out the constraints and suggestions as perceived by the departmental officials.

RESOURCES AND METHODS

The study was carried out in Kadapa district of Andhra Pradesh in which the SHC Scheme was implemented since its inception year 2015-16. *Ex-post facto* research design was used in the study. Mainly three mandals were selected from where soil samples were brought frequently.A list of the SHC beneficiary farmers of Vallur, C K Dinne and Vontimittamandals were selected randomly. From each mandalfour villages were selected randomly. From each village five respondents were selected randomly for the study. Thus, the study comprise of 3 mandals, 12 villages and 60 soil tested farmers. The interview schedule was designed in line with the objectives of the study. Both primary and secondary data was collected for the study. Data was analyzed using descriptive statistics tools like frequency, percentage, mean, standard deviation.

OBSERVATIONS AND ANALYSIS

The respondents were distributed different categories based on their selected profile characteristics and were presented in the following tables and interpreted through frequencies, means, percentages and standard deviation.

Age:

The Table 1 above shows that the majority of SHC respondents (61.67%) came from the middle age category after which came the young (21.67%) and the old (16.66%).

Education:

The results shown in the above Table 2 indicate that the majority (25%) each of the SHC respondents were middle and high school followed by primary school (23.33%), functionally literate (13.33%), no schooling/ illiterate (11.67%) and college education (1.67%).

Caste:

From the above Table 2 we can conclude the majority (81.67%) of the SHC respondentswere under open category followed by schedule caste (8.33%), schedule tribes (6.67%) and backward caste (3.33%).

Farming experience:

The Table 2 describes that 55 per cent of the SHC respondents having medium level of farming experience followed by 23.33 per cent with high level farming experience and 21.67 per cent of SHC respondents having low level of farming experience.

Annual income:

An over view of the Table 2 indicated that 53.33 per cent of the SHC respondents had medium level of annual income, followed by low and high 25 and 21.67 per cent, respectively.

Land holdings:

On perusal of Table 2 reported that majority (35%) of SHC respondents belonged to small land holdings followed by medium (30%), semi-medium (15%), marginal (11.67%) and large farmers (8.33%).

Source of information:

From the Table 2 it is observed the majority of SHC

Table 1: Socio-economic characteristics of the groundnut farmers

Sr. No.	Variables	Category	Respondents	
			F	P
1.	Age	Young (<38 years)	13	21.67
		Middle (39- 61 years)	37	61.67
		Old (>61 years)	10	16.66
	Mean=50	Total	60	100
	SD =11.69			
2.	Education	No schooling/illiterate	7	11.67
		Functionally literate	8	13.33
		Primary school	14	23.33
		Middle school	15	25.00
		High school	15	25.00
		College education	1	1.67
		Total	60	100
3.	Caste	SC	5	8.33
		ST	4	6.67
		BC	2	3.33
		OC	49	81.67
		Total	60	100
4.	Farming experience	Low (<13 years)	13	21.67
		Medium (14-25)	23	55.00
		High (>25)	14	23.33
	Mean=25.47	Total	60	100
	SD =12.25			
5.	Annual income	Low (<50000)	15	25
		Medium (50001-200000)	32	53.33
		High (>200000)	13	21.67
	Mean=1.5	Total	60	100
	SD =1			
6.	Land holdings	Marginal – less than 1 hectare	7	11.67
		Small – 1-2 hectare	21	35
		Semi-medium – 2-4 hectare	9	15
		Medium – 4-10 hectare	18	30
		Large – 10 hectare and above	5	8.33
		Total	60	100
7.	Source of information	AEO	9	15.00
		AO	13	21.67
		ADA	4	6.67
		Scientist	10	16.67
		Neighbor	6	10.00
		Relatives	18	30.00
		Total	60	100
8.	Family size	Small (upto 5)	46	76.67
		Large (>5)	14	23.33
		Total	60	100

Table 1: Contd...............

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9.	Family type	Nuclear	41	68.33
		Joint	19	31.67
		Total	60	100
10.	Social participation	No membership	54	90
		Membership	6	10
		Total	60	100
11.	Extension contact	Low	24	40
		Medium	15	25
		High	21	35
	Mean=1.95	Total	60	100
	SD =0.87			

respondents (30%) were getting information from relatives, followed by AO (21.67%), scientist (16.67%), AEO (15%), neighbours (10%) and ADA (6.67%).

Family size:
It could be comprehended from the Table 2 that a majority of the SHC respondents were having small family size (76.67%) and large family size (23.33%).

Family type:
Results furnished in Table 2 indicated that majority (68.33%) of the SHC respondents were having nuclear type of family followed by joint family (31.67%).

Social participation:
The results from Table 2 reported that 90 per cent of the SHC respondents were not having membership and 10 per cent of the SHC respondents were having membership.

Extension contact:
An overview of the Table 2 indicated that majority (40%) of the SHC respondents had low extension contact, followed by high (35%) and medium level of extension contact (25%).

From the study (Table 2) it is revealed that majority of the respondents regarding the results given in SHC are reliable (73.33%) expresses that they are in undecided state followed by 15 per cent of farmers were agreed and 11.67 per cent were disagreed. In case of the results given in SHC are useful to increase yields (58.33%) were under undecided state by agree (26.67%) and disagree

Table 2: Perception level of the selected respondents of the study						(n=60)
Sr. No.	Statement	A		UD		DA
		F	P	F	P	F	P
1.	The results given in SHC are reliable	9	15	44	73.33	7	11.67
2.	The results given in SHC are useful to increase yields	16	26.67	35	58.33	9	15
3.	The SHC were given in time	17	28.33	8	13.33	35	58.33
4.	The results given in SHC are useful to reduce cost of cultivation	9	15	24	40	27	45
5.	SHC helps in selecting right crop suitable to the soils	13	21.67	38	63.33	9	15
6.	Information provided in SHC helps to sustain soil fertility	22	36.67	27	45	11	18.33
7.	Information provided in SHC was simple to understand	16	26.66	4	6.67	40	66.67
8.	Information provided in SHC was simple to adopt	32	53.34	14	23.33	14	23.33
9.	Micro nutrient management is possible with SHC	19	31.67	27	45	14	23.33
10.	Problematic soils were easily diagnosed with SHC	21	35	22	36.67	17	28.33
11.	Reclamation of problematic soils with SHC	9	15	28	46.67	23	38.33

(15%). With regard to the SHC were given in time majority of the farmers (58.33%) disagreed followed by (28.33%) and (15%) were agreed and undecided, respectively. Majority of the farmers (45%) expressed that the results given in SHC are useful to reduce cost of cultivation was disagreed followed by undecided (40%) and agreed (15%). In case of SHC helps in selecting right crop suitable to the soils most of the farmers (63.33%) were undecided followed by agree (21.67 %) and disagree (15%). With respect to information provided in SHC helps to sustain soil fertility majority of the farmers (45%) were undecided followed by agree (36.67%) and disagree (18.33%). In case of information provided in SHC was simple to understand majority of the farmers (66.67%) express disagree followed by agree (26.66%) and undecided (6.67%). While information provided in SHC was simple to adopt most of the farmers (53.34%) expresses undecided followed by agree (13.33%) and disagree (6.67%). Micro nutrient management is possible with SHC most of the farmers (45%) expressed undecided followed by (31.67%) agreed and (23.33%) disagreed. Problematic soils were easily diagnosed with SHC most of the farmers (36.67%) were under undecided followed by agree (35%) and disagree (28.33%).

From the (Table 3 and Fig. 1) the study reveals that overall perception of the respondents on soil health cards that 66.67 per cent of the farmers were having medium level of perception followed by 20 per cent of the respondents were having low level of perception and 13 per cent of the responded were having high perception.
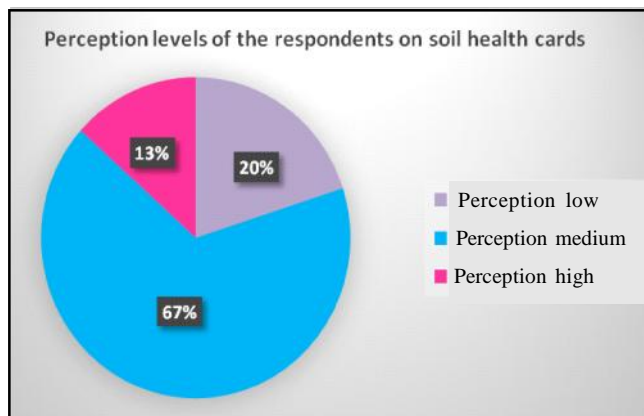

Fig. 1: Perception levels of the respondents on soil health cards

Further the findings of study on adoption levels of different nutrients (Table 4) by the farmers is that majority of the framers (63.33%) were not adopted recommended organic manures as per SHC results followed by adopted (36.67%). With respect to recommended nitrogen as per SHC results most of the farmers (85%) were not adopted followed by adopted (15%). In case of recommended phosphorous as per SHC results most of the farmers not adopted as per SHC recommendation followed by adopted (8%). With regard to recommended potash as per SHC results most of the farmers (90%) not adopted followed by adopted (10%).With respect to recommended Micro nutrients as per SHC results majority of the farmers (80%) not adopted followed by adopted (20%). In case of recommended gypsum/lime as per SHC results most of the farmers (96.67%) not adopted followed by adopted

Table 3 : Overall perception of the respondents on SHCs		(n=60)
Category	Frequency	Percentage
Low (<18)	12	20
Medium (18-27)	40	66.67
High (>27)	8	13.33
Mean= 21.62 SD=4.07		

Table 4 : Adoption levels of soil health cards by the selected respondents					
Sr. No.	Statement	Adopted		Not adopted	
		F	P	F	P
1.	Recommended organic manures as per SHC results	22	36.67	38	63.33
2.	Recommended Nitrogen as per SHC results	9	15	51	85
3.	Recommended Phosphorous as per SHC results	5	8.33	55	91.67
4.	Recommended Potash as per SHC results	6	10	54	90
5.	Recommended Micro nutrients as per SHC results	12	20	48	80
6.	Recommended Gypsum/Lime as per SHC results	2	3.33	36	96.67

(3.33%)

The reasons for low level of SHC adoption by the farmers is due to non-availability of advisory services from the concerned department, they have awareness on the SHC Card availability because it is mandatory for getting free zinc from the department and also to install drip irrigation in the farmer's field. They don't have awareness on the importance of SHC and its recommendations. They have difficulty in interpreting the result given on the card.
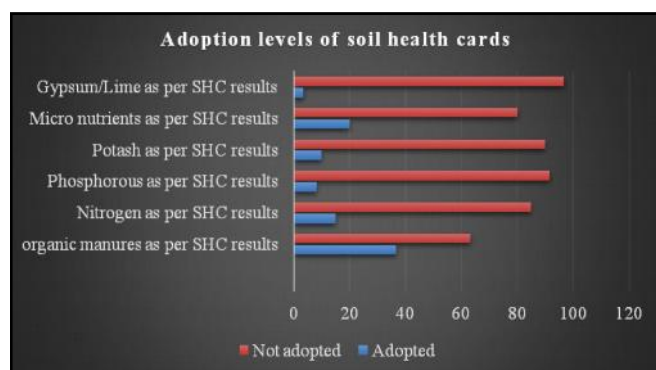

Fig. 2 : **Adoption levels of soil health cards by the selected respondents**

From the Table 5a it is clear that with regard to nitrogen recommendations in the SHC the frequency of adoption by the most of the farmers in various crops were less.

From the Table 5b it is clear that with regard to phosphorous recommendations in the SHC the frequency of adoption by the most of the farmers in various crops were less.

From the Table 5c it is clear that with regard to potassium recommendations in the SHC the frequency of adoption by the most of the farmers in various crops were less.

With regard toconstraints from the Table 5 results revealed that farmers feel that fertilizer dose is not sufficient if applied as per SHC result (88.33%) followed by difficult to understand and follow the recommended doses (81.67%), lack of guidance (80%), delay in issuing soil health cards (78.33%), getting the SHC card for the sake of free zinc supplied by the DOA (75%), illiteracy of the farmers (53.33%), non-availability of gypsum in nearby shops (50%), lack of awareness about soil sampling (41.67%) and if applied fertilizer as per SHC results – getting lower yields (33.33%).

From the Table 6 it can be inferred that the suggestions given by the SHC respondents for overcoming the constraints for adoption of soil health card recommendation was method of calculating the fertilizer dose on the basis of nutrient status of the soil should be given on SHC, training should be given on soil sample collection procedure and also its importance and timely supply of soil health cards to the farmers.

From the Table 7 it is clear that the reasons for not adopting soil health cards by the farmers as perceived by the mandal agricultural officers. The first reason as

Table 5 : Deviations in adoption of SHC recommendations				(n=60)
Table 5a: Deviations in adoption of nitrogen recommendation				
		Nitrogen		
Sr. No.	Crop	Recommended level of adoption		More adoption
		F	P	F	P
1.	Paddy	2	3.33	58	96.67
2.	Groundnut	1	1.67	39	97.5
3.	Bengal gram	1	3.44	28	96.55
4.	Sesamum	0	0	20	100
5.	Green gram	0	0	15	100
6.	Cow pea	0	0	2	100
7.	Turmeric	0	0	40	100
8.	Chrysanthemum	0	0	20	100
9.	Tomato	0	0	5	100
10.	Acid lime	0	0	20	100
11.	Cotton	0	0	5	100
12.	Banana	0	0	21	100

Table 5b : Deviations in adoption of nitrogen recommendation

| Sr. No. | Crop | Phosphorous | | | |
| | | Recommended level of adoption | | More adoption | |
		F	P	F	P
1.	Paddy	2	3.33	58	96.67
2.	Groundnut	1	1.67	39	97.5
3.	Bengal gram	1	3.44	28	96.55
4.	Sesamum	0	0	20	100
5.	Green gram	0	0	15	100
6.	Cow pea	0	0	2	100
7.	Turmeric	0	0	40	100
8.	Chrysanthemum	0	0	20	100
9.	Tomato	0	0	5	100
10.	Acid lime	0	0	20	100
11.	Cotton	0	0	5	100
12.	Banana	0	0	21	100

Table 5c: Deviations in adoption of nitrogen recommendation

| Sr. No. | Crop | Potassium | | | |
| | | Recommended level of adoption | | More adoption | |
		F	P	F	P
1.	Paddy	2	3.33	58	96.67
2.	Groundnut	1	1.67	39	97.5
3.	Bengal gram	1	3.44	28	96.55
4.	Sesamum	0	0	20	100
5.	Green gram	0	0	15	100
6.	Cowpea	0	0	2	100
7.	Turmeric	0	0	40	100
8.	Chrysanthemum	0	0	20	100
9.	Tomato	0	0	5	100
10.	Acid lime	0	0	20	100
11.	Cotton	0	0	5	100
12.	Banana	0	0	21	100

Table 6 : Constraints for non-adoption of SHC recommendations   **(n=60)**

Sr. No.	Constraints / Reasons	F	P	Rank
1.	Delay in issuing soil health cards	47	78.33	IV
2.	Lack of awareness about soil sampling	25	41.67	VIII
3.	Non-availability of gypsum in nearby shops	30	50	VIII
4.	If applied fertilizer as per SHC results – getting lower yields	20	33.33	IX
5.	Farmers feel that fertilizer dose is not sufficient if applied as per SHC result	53	88.33	I
6.	Difficult to understand and follow the recommended doses	49	81.67	II
7.	Lack of guidance	48	80	III
8	Illiteracy of the farmers	32	53.33	VI
9	Getting the SHC card for the sake of free zinc supplied by the DOA	45	75	V

Table 7 : Suggestions to overcome constraints expressed by the farmers

Sr. No.	Suggestion
1.	Method of calculating the fertilizer dose on the basis of nutrient status of the soil should be given on SHC
2.	Training should be given on soil sample collection procedure and also its importance
3.	Timely supply of soil health cards to the farmers

Table 8 : Reasons for non-adoption of soil health card as perceived by MAOs (n=30)

Sr. No.	Reason	F	%	Rank
1.	Farmers following traditional methods of fertilizer application	2	6.66	V
2.	Need based soil testing is not being followed	1	3.33	VI
3.	Lack of awareness on the Importance of soil testing	7	23.33	II
4.	Targets for soil sampling were much higher	1	3.33	
5.	Not receiving timely soil health card to farmers	11	36.66	I
6.	Recommended fertilizer dose packages were not available	5	16.66	IV
7.	Applying over doses of fertilizers by comparing with other farmers in the village	6	20.00	III
8.	Farmers were not believing in SHC recommendations	1	3.33	VI
9 .	Farmers were in the belief that high doses of fertilizers give good results	2	6.66	V

perceived by the MAOs is that not receiving timely soil health card to farmers followed by second reason lack of awareness on the Importance of soil testing, third reason applying over doses of fertilizers by comparing with other farmers in the village, fourth reason recommended fertilizer dose packages were not available, fifth reason farmers following traditional methods of fertilizer application, sixth reasons need based soil testing is not being followed and farmers were not believing in SHC recommendations.

Conclusion:

In the present work, we evaluated that over all perception levels on SHC by the farmers had low level of perception. Recommended doses of fertilizers were not fully adopted by the farmers. Most of the farmers were taking SHC cards for the sake of getting free zinc from the agricultural department and for installation of drip irrigation.

Recommendations:

It is suggested that more comprehensive study should be conducted covering large scale population survey for extending to different locations of Andhra Pradesh for drawing valid generalisations on board basis. From this study we can recommend that ensured method of calculating the fertilizer dose on the basis of nutrient status of the soil should be given on SHC, Training should be given on soil sample collection procedure to farmers, giving them advices on the SHC results and explaining them how to use the SHC card for applying RDF in the fields. As we know that "Seeing is Believing" we should show them the results between soil test based crop cultivation and also the non-soil test based fertilizers in the field.

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