Impact of Soil Health Card Recommendations on the Paddy Farmers

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ABSTRACT

The present study entitled "Impact of Soil Health Card Recommendations on the Paddy Farmers" was undertaken as Research Review Committee Project for the year 2021-22 and 2022-23 in Bhandara district of Vidarbha region in Maharashtra State. An experimental design of social research was used for present study. A sample of 60 Soil Health Card (SHC) beneficiary paddy farmers and 60 SHC non beneficiary paddy farmers were selected randomly from this district. Thus, total 120 respondents were constituted sample for the present study and information obtained from them was considered for tabulation and analysis of data.

The findings regarding respondents socio-economic characteristics revealed that, average age of the Soil Health Card (SHC) beneficiary (47.4 yrs) and SHC non beneficiary (48.9 yrs) was found in middle age group, average education of beneficiary was found upto 9th standard and 7th standard in non beneficiary. 83.33 per cent beneficiary and 85.00 per cent non beneficiary had agriculture as a main occupation with an average 27.3 years and 29.37 years of farm experience possessed by both beneficiaries as well as non beneficiaries where as average family size number was upto five members and average three number of people engaged in farming of beneficiaries as well as non beneficiaries. Above one third (35.00%) of the beneficiary and nearly one third (33.33%) possessed small category of land holding. About 73.34 per cent of beneficiary and 56.67 per cent non beneficiary mentioned that SAUs/KVKs scientists were the major sources of information about SHC programme followed by progressive farmers.

As regard knowledge of SHC contents and usefulness, majority (90.00%) of beneficiary had high level of knowledge whereas majority (86.67%) of non beneficiary showed medium level of knowledge. With regards to adoption of SHC recommendations nearly two third beneficiary (63.34%) were found in high level of adoption category.

While studied the Impact of SHC recommendations on paddy farmers, it was found that there was change in productivity and income to the tune of 15.92 and 16.15 per cent over that of non beneficiary farmers. It could definitely be inferred that, the SHC Programme had a positive and significant impact on the beneficiary farmers.

Key words: Impact,Soil Health Card Recommendations, Paddy Farmers

Agriculture is the backbone of Indian economy. Progress of India is very much dependent on the development of agriculture. The increased agricultural production depends upon number of factors of which soil fertility plays an important role. Soil fertility is identified by the nutrient status of the soil. Soil testing has been used by soil scientist as an aid in determining soil fertility level.

Soil fertility plays a key role in increasing crop production in almost all soils of the world. Now in the present situation, there is a gap of 10 million tones plant nutrients between removal of crop and replenishment. Soil testing is a general evaluation program of soil fertility that helps farmers to use chemical fertilizers wisely.

Agriculture in India has undergone considerable transformation over time. Some aspects of this transformation are seen in the form of changes in agrarian structure, technological interventions, cropping pattern, enterprise mix and marketing system. During early phases of agricultural development, much emphasis was placed on increasing agricultural production through adoption of high yielding varieties along

with use of chemical fertilizers and pesticides. This had led to intensive use of land and agricultural inputs particularly in the regions endowed with irrigation facilities. The more use of HYVs necessitated the more application of chemical fertilizers. The use of chemical fertilizers in India has tremendously grown since the advent of green revolution in late 1960s. With the improvement in production since green revolution period, India's position has turned from the state of net importer of agricultural products to exporter of certain agricultural commodities like rice, wheat and sugar. At farm household level also, the green revolution technology has helped to improve the livelihood pattern, nutrition and education of children. However, the technology has brought some negative aspects as well (Elumalai, 2016). Since it proved successful in irrigated areas, dry land regions and crops grown therein were left out of the process and hence had created regional disparity in rural income (Krishnaji 1975; Rao 1996). Further, the technology has also altered traditionally followed cropping pattern, which comprised growing multiple crops every season to mono-cropping, for example cultivation of only rice in some parts of south India. This practice put the land and other resources under severe strain resulting in depletion of soil nutrients, decline in water table, build up of pest and diseases, and micro-nutrient deficiency. There are concerns about the indiscriminate use of chemical fertilizers by the farmers with a view to increase the crop yield (Bera, 2016). This has led to deterioration of soil structure, wastage of nutrients, destruction of soil micro-organisms and scorching of plants at the extreme cases. A combination of factors such as intensive cultivation of crops, differential pricing of fertilizers and subsidy might have contributed to excessive use of fertilizers by the farmers. Besides, due to lack of awareness among the farmers about balanced use of fertilizer, there are wide spread problems related to the indiscriminate use of chemical fertilizers, mismanagement of surface water and over exploitation of ground water.

The over use of chemical fertilizers in most parts of India in the last few decades led to several problems affecting soil health, nutrient flow and natural environment. There is a need for promoting, among others, balanced use of fertilizers for increasing productivity of crops and for better absorption of nutrients from the applied fertilizers. The adoption of recommended doses of fertilizer either as per the State Agricultural Universities (SAU) norms or as given in the Soil Health Card (SHC) is essential.

Many initiatives have been undertaken by the government to ameliorate the above mentioned situation and encourage the farmers for balanced use of fertilizers. These initiatives included, among others, decontrol of phosphatic and potassic fertilizers, promotion of integrated nutrient management, promotion of organic manures and bio-fertilizers, National Project on Management of Soil Health and Fertility(NPMSF), and Nutrient Based Subsidy (NBS) policy. Attempts have also been made to strengthen and revamp soil testing laboratories in various districts under NPMSF. Farmers are encouraged to test their soil periodically and apply fertilizers based on the deficiency of nutrients in soil. This is intended to ensure balanced supply of nutrients for maintaining soil health and improving crop productivity. Soil testing helps the farmers to know the fertility status of the soil and apply optimum dose of fertilizers. Research evidence shows that soil test based fertilization has significant impact on crop yield (Bhatt *et al.*, 2013). Further, this helps to reduce operational expenditure, incidence of pests and diseases, and environmental pollution.

The soil nutrient management technology is a bundle of technology package comprising two components viz., soil testing and application of fertilizers based on soil test results. Soil testing includes collection of representative soil samples by following standard procedure, packing and transporting to soil test laboratories for testing of nutritional status. After testing of soil, soil health cards are prepared and distributed to farmers. Soil health card mainly contains details of soil fertility status and dosage of fertilizer to be applied to

reference crops. Soil test values remain valid for three years and hence it is recommended that soil testing should be done once in three years. Therefore, adoption of soil nutrient management technology is sequential in nature.

Now a day consumption of fertilizer by farmer is higher than actual requirement. The farmers do not follow the soil health recommendations. The present study throws a light on knowledge, adoption and constraints faced by the paddy farmers in adoption of soil health recommendations.

The present investigation includes the extent of knowledge and adoption of beneficiary paddy farmers about soil health card recommendations at field level by the selected farmers. Further the present study also includes impact assessment of SHC recommendations in terms of yield and income of paddy farmers. It also tries to find out the constraints experienced by SHC beneficiary farmers in adoption of soil health recommendations at the field level.

METHODOLOGY

The present investigation was carried out for the 2021-22 and 2022-23 year in Bhandara district of Vidarbha Region in Maharashtra State. There are 7 tahsils in Bhandara district but, the implementing agency of the SHC scheme in the Sakoli (Krishi Vigyan Kendra, Sakoli) distributed SHCs mainly in two tahsils namely Sakoli and Lakhni in the first phase. Hence, those two tahsils selected for the study purposively. The experimental design of the social research was used in the present study as it aimed to assess the impact of Soil Health Card recommendations at field level by the soil health card beneficiary and non beneficiary paddy farmers.

From Bhandara district two tahsils and five villages were selected purposively for the study. The list of soil health test farmers was obtained from the office of KVK, Sakoli Dist. Bhandara. From this list, five villages were selected purposively from each tahsil and from each villages, SHC beneficiary and non beneficiary were selected by proportionate random sampling method. Thus, in all 60 SHC beneficiary and 60 SHC non beneficiary paddy farmers from five villages were selected by proportionate random sampling method and constituted the total sample is 120 respondents.

FINDINGS AND DISCUSSION

The detail research report with all relevant data has been furnished herewith.

I. Profile of respondents

The data with respect to various characteristics of the respondents have been furnished in Tables 1, 2 and 3 respectively.

1) Socio-economic characteristics of respondents

The socio-economic characteristics of SHC beneficiary and SHC non beneficiary paddy farmers are presented in Table 1. It can be seen from the Table 3 that the average age of SHC beneficiary paddy farmers was around 47 years whereas in case of SHC non beneficiary paddy farmers it was around 49 years. The average education of SHC beneficiary was upto 9th std. followed by 7th std. education possessed by SHC non beneficiary. The SHC beneficiary with respect to average three number of people engaged in agriculture and average 27 years of experience in farming. Similar trend was found in SHC non beneficiary farmers. Majority (83.33%) of SHC beneficiary and (85.00%) SHC non beneficiary farmers possessed agriculture as their main occupation. Thus, the SHC beneficiary were relatively younger and high educated farmers than SHC non beneficiary farmers in their major occupation agriculture.

Table 1
Socio-economic characteristics of respondents

Sl. No.	Particulars	SHC Beneficiary (n=60)	SHC non beneficiary (n=60)
1	Average age of respondent (years)	47.4	48.9
2	Average years of respondent education(Std)	09	07
3	Agriculture as main occupation (% of respondents)	83.33	85.00
4	Average family size (No.)	4.8	4.97
5	Average number of people engaged in farming(No.)	2.92	3.08
6	Average years of experience in farming(Yrs)	27.43	29.37

2) Distribution of sample respondents by Farm Size

The distribution of sample respondents is presented in Table 2. Among the selected farmers, the marginal and small farmers together constituted about 53.33 per cent of total SHC beneficiary farmers and 41.67 per cent of them were middle farm size. The remaining sample respondents (05.00%) were the large land holding farmers. With regards to SHC non beneficiary farmers, the marginal and small farmers together constituted 53.33 per cent, followed by 36.67 per cent of them in middle farm size and only (10.00%) of them were the large land holding farmers.

Table 2
Distribution of respondents by land holding category

Sl.No.	Land holding category (ha.)	SHC beneficiary farmers (n=60)		SHC non beneficiary farmers (n=60)	
		Freq	Percentage	Freq	Percentage
1	Marginal (Upto 1.00)	11	18.33	12	20.00
2	Small (1.01 -2.00)	21	35.00	20	33.33
3	Semi Medium (2.01-4.00)	15	25.00	16	26.67
4	Medium (4.01-10.00)	10	16.67	06	10.00
5	Large (Above 10.00)	03	05.00	06	10.00
	Total	60	100.00	60	100.00

3) Sources of information about Soil Testing

To explore more about the extent of use of various information sources by the SHC beneficiary farmers and SHC non-beneficiary farmers percentage analysis was carried out. The results (Table 3) show that among various information sources Krishi Vigyan Kendra (KVK) acted as regular information source for both SHC beneficiaries (73.34%) and SHC non-beneficiaries (33.33%). Also, some SHC beneficiaries (10.00%) and majority of the SHC non-beneficiaries (56.67%) were using KVK occasionally as information source.

Table 3
Distribution of respondents according to the utilization of information sources for soil testing

Information Sources	**Level of Utilization**	**SHC beneficiary farmers (n=60)**		**SHC non-beneficiary farmers (n=60)**	
		Frequency	**Percentage**	**Frequency**	**Percentage**
Block level extension officials	Regular	00	00.00	00	00.00
	Occasional	03	05.00	00	00.00
	Never	57	95.00	60	100.00
KVK /Univ. scientists	Regular	44	73.34	20	33.33
	Occasional	06	10.00	34	56.67
	Never	00	00.00	06	10.00
Neighbours	Regular	05	08.34	02	03.34
	Occasional	39	65.00	48	80.00
	Never	16	26.66	10	16.66

Relatives	Regular	07	11.66	02	03.34
	Occasional	38	63.34	34	56.66
	Never	15	25.00	24	40.00
Progressive farmers	Regular	30	50.00	01	01.66
	Occasional	23	38.34	26	43.34
	Never	07	11.66	33	55.00
AEO/ Gramsevak	Regular	07	11.66	00	00.00
	Occasional	31	51.67	30	50.00
	Never	22	36.67	30	50.00

After KVK the other personal sources utilized by both groups of farmers were neighbours, relatives, and AEO/Gramsevak but, mostly on occasional basis. Most of the SHC beneficiary farmers (65.00%) and non-beneficiary farmers (80.00%) used neighbours occasionally as information source. Relatives were also acted as occasional information sources to most of the SHC beneficiaries (63.34%) and non- beneficiaries (56.66%). Majority of the SHC beneficiaries (51.67%) and non- beneficiaries (50.00%) used Gramsevaks/AEO also occasionally. The probable reason behind KVK as major source of information for the beneficiary farmers was possession of vehicle, which help them to attend the programmes conducted by KVK). Yadav et al. (2006) found the similar results in his study carried out in the Faridabad district of Haryana that 63 per cent of the farmers studied were depending on government officials of Agricultural Department and Krishi Vigyan Kendra.

From the above findings it was concluded that the major sources of information about the SHC programme were the State Agricultural Universities/Krishi Vigyan Kendras, the government officials at grass root level (Gram Sevek and Extension Officers). The relatives, friends, neighbours and fellow farmers were the next major sources of information for the sample farmers.

4) Details of Soil Testing

As discussed in earlier chapters, soil testing was carried out for 60 farmers as presented in Table 4. The details on the soil testing and related parameters based on SHC-KVK are presented in Table 6. The cost of soil test was nil for all soil test farmers since it was provided free of cost by the Government under RKVY. The average distance travelled to soil test lab (STL) was around 13.60 km. From every selected plot, 4 to 5 samples were taken for soil testing. The average distance of soil tested plots from the villages was around 1.90 km. None of the sample farmers could get the services of Mobile Soil Testing Vans. Surprisingly, the proportion of soil tested area varied inversely with size classes of the farmers, i.e., large farmers had lowest proportion of their lands tested and vice -versa. It may be noted that the average duration for getting SHC from the date of sample collection was 31 days.

Table 4
Details of Soil Testing by respondents

Sl. No.	Particulars	SHC beneficiary farmers (n=60)
1	% of farmers tested their soil in last three years	100.00
2	Average cost of soil testing- Govt (Rs/sample)	00.00
3	Average distance from field to soil testing lab (km)	13.60
4	Average number of soil samples taken per plot (No.)	05.00
5	Average no. of plots considered for soil testing (No.)	01.00
6	Average distance of soil tested plots from the village (km)	01.90
7	Average duration for getting SHC from the date of sample collection (days)	31.00
8	Average number farmers get the service of Mobile testing vans	00.00

Note: Total exceeds 100 due to multiple responses.

5) Knowledge of respondents about SHC contents and usefulness

It is reveled from Table 5 that, knowledge with respect to all the recommendations and SHC contents and usefulness to the beneficiary respondents were found higher as compared to non beneficiary respondents.

In case of beneficiary farmers, knowledge about name of nutrients and fertilizers, recommended doses of nutrients and fertilizers and method to calculate dose of fertilizer based on the available nutrients in the soil was found to be higher level than non beneficiary respondents.

Table 5
Distribution of respondents according to their knowledge about SHC contents and usefulness

Sl.No.	Statements	SHC beneficiary (n=60)		SHC non beneficiary (n=60)	
		Yes (%)	No (%)	Yes (%)	No (%)
1	Name of nitrogenous fertilizers mentioned in SHC	60 (100.00)	00 (00.00)	05 (08.33)	55 (91.67)
2	Name of phosphate fertilizers mentioned in SHC	60 (100.00)	00 (00.00)	04 (06.66)	56 (93.34)
3	Name of potassium fertilizers mentioned in SHC	60 (100.00)	00 (00.00)	05 (08.33)	55 (91.67)
4	SHC provides information about organic carbon	54 (90.00)	06 (10.00)	01 (01.67)	59 (98.33)
5	SHC provide information about Electric conductivity	03 (05.00)	57 (95.00)	00 (00.00)	60 (100.00)
6	SHC provide information about P.H	58 (96.67)	02 (03.33)	05 (08.33)	55 (91.67)
7	SHC provide method to calculate dose of fertilizer based on the available nutrients in the soil	46 (76.67)	14 (23.33)	02 (03.33)	58 (96.67)
8	Recommended doses of fertilizers for paddy crop is given in SHC	57 (95.00)	03 (05.00)	02 (03.33)	58 (96.67)
9	Recommendation of Organic manures is mentioned in SHC	52 (86.67)	08 (13.33)	01 (01.67)	59 (98.33)
10	Name of Biofertilizer is recommended for paddy crop	57 (95.00)	03 (05.00)	00 (00.00)	60 (100.00)

The result of overall knowledge index (Table 6) shows that great majority of SHC beneficiary (90.00%) were having high knowledge level and quite a few beneficiary (10.00%) were having medium level of knowledge whereas 86.67 per cent of non- beneficiary were having medium knowledge level, followed by 11.66% of them having low knowledge, and minority (01.67%) having high knowledge knowledge about SHC contents and usefulness. .

The reason behind more knowledge of SHC beneficiary farmers on soil sampling and soil testing aspect might be due to their experience in taking the soil samples for generating the SHC under the guidance of the government agency who was responsible for SHC generation and distribution in the area i.e. the KVK. Moreover, their relatively better knowledge about usefulness of the SHC and contents of a SHC also appreciable and definitely it is because of their good contact with the KVK. It was explicit in the information source utilization of the SHC beneficiaries (Table 6) that most of them were regularly (73.34% farmers) or occasionally (10.00% farmers) contacting officials of KVK to gain agriculture related information.

Patel *et al* (2017) also reported about that hardly one third of SHC holders they studied had low level of knowledge in soil testing and benefits of SHC. Mukati (2016) also reported about SHC holder's high level awareness about the utility of the card.

Table 6
Distribution of respondents according to overall knowledge index level

Sl. No.	Knowledge index level	Knowledge index range	SHC beneficiary (n=60)		SHC non-beneficiary (n=60)	
			Frequency	Per cent	Frequency	Per cent
i	Low	Upto 33.33	00	00.00	07	11.66
ii	Medium	33.34 to 66.66	06	10.00	52	86.67
iii	High	Above 66.66	54	90.00	01	01.67
	Total		60	100.00	60	100.00

6) Adoption of Soil Health Card recommendations by beneficiary Farmers

The level of adoption of recommended doses were examined from the angle of farmers own perception. It was observed that the number of fertilizer products used by the farmers varied a lot among the farmers. Some farmers used DAP and some farmers used SSP or NPK mixture instead. Some farmers used MOP and some farmers used Potassium Sulphate. Since the NPK ration varies across various fertilizer products and farmers were using a variety of fertilizer products, it was difficult to make a comparative assessment on their adoption of recommended doses. To make it simple, all the fertilizer products recommended were expressed in terms of major nutrients (N, P, K).

The data in Table 7 shows that, majority of the beneficiary were fully adopted as per soil health card recommendations of soil test such as nitrogenous fertilizers (53.34%), phosphate fertilizers (43.33%) and organic manures (45.00%).However potash fertilizers (71.66%) and biofertilizers (46.66%) were partially adopted by the beneficiary as per the soil health card recommendations. The present findings were supported by Dohtare (2014) who found that majority of the respondents (69.00%) were partially adopt the application of nitrogen fertilizer as per the soil test recommendation. Whereas 73.00 per cent respondents partially adopt application of phosphorus fertilizer and 63.00 per cent of the respondents partially adopt recommended application of potash fertilizer, as per soil test report.

Those farmers, who adopted the recommended doses completely, were asked about the underlying reasons for application of recommended doses of fertilizers. It may be noted from Table 7 that majority of farmers believed that the cost on fertilizer use and thus cost of production would be reduced by adopting the recommended doses, since it may reduce the quantity of recommended doses of fertilizers. Hence these farmers expressed that they wanted to apply recommended doses to maintain better soil health and to increase crop yield.

Table 7
Distribution of respondents according to their extent of adoption of soil health card recommendations

Sl. No.	Soil health recommendations of soil test	SHC beneficiary farmers (n=60)			Overall Mean Adoption Index
		Full (%)	Partial (%)	Non adoption (%)	
1	Nitrogenous fertilizers used as per the soil health card recommendations	32 (53.34)	27 (45.00)	01 (01.67)	74.45
2	Phosphate fertilizers used as per the soil health card recommendations	26 (43.33)	21 (35.00)	13 (21.67)	
3	Potash fertilizers used as per the soil health card recommendations	05 (08.33)	43 (71.66)	12 (20.00)	
4	Organic manures used as per the soil health card recommendations	27 (45.00)	23 (38.33)	10 (16.67)	
5	Biofertilisers used as per the soil health card recommendations	24 (40.00)	28 (46.66)	08 (13.34)	

Extent of adoption

It could be seen from Table 8 that, nearly two third (63.34%) of the respondents were found in high category of adoption level , followed by 36.64 per cent respondents in medium adoption level category and none of the respondents were observed in low category of adoption level. Therefore, it can be inferred that majority of the farmers had high adoption of soil health recommendations. Similar findings were reported by Dohtare (2014) who found that most of the respondents (73.00 %) had medium level of adoption of soil test recommendations

Table 8
Distribution of respondents according to overall adoption index level

Sl. No.	Adoption index level	Adoption index range	Frequency (n=60)	Per cent
i	Low	Upto 33.33	00	00.00
ii	Medium	33.34 to 66.66	22	36.66
iii	High	Above 66.66	38	63.34
	Total		**60**	**100.00**

Gross income from paddy production

Gross income realized by the SHC beneficiary and non beneficiary paddy farmers from agriculture during Kharif season is presented Table-9. In both the groups, all the sample farmers cultivated Kharif paddy. The total production of Kharif paddy stood at 2162.00 qtl. with an average yield of 36.03 qtl. per ha. against the SHC non beneficiary paddy farmers group and 1865.29 qtl. with an average yield of 31.08 qtl per ha. against the SHC beneficiary paddy farmers. Production per hectare and the yield rate (36.03 qtl. / ha.) was more in SHC beneficiary paddy farmers as compared to the SHC non beneficiary paddy farmers. It might be due to use of recommended doses of fertilizers and nutrients by SHC beneficiary paddy farmers.

In SHC beneficiary paddy farmers group, a gross return of Rs.4403994.00 (Rs.73393 / ha.) were received and in case of SHC non beneficiary paddy farmers, the gross returns were worked out at Rs.3792135.00 (Rs.63,186 / ha.) in kharif paddy, respectively. The productivity of paddy crop and marginal price variation were the major factors of difference in gross return per hectare.

Table 9
Gross income realized by the SHC beneficiaries and SHC non beneficiaries by paddy production

Crop	SHC beneficiary farmers (n=60)					SHC non beneficiary farmers (n=60)				
	Production (Qtls.)		Avg. price (Rs/Qtl)	Gross income obtained (Rs)		Production (Qtls.)		Avg. price (Rs/ Qtl)	Gross income obtained (Rs)	
	Total	Avg. Per/ ha		Total	Per/ ha	Total	Avg. Per/ ha		Total	Per/ ha
Paddy	2162.00	36.03	2037	4403994	73393	1865.29	31.08	2033	3792135	63186

A cursory look at Table- 9, reveals that mean index of productivity / ha (36.03) and income / ha (Rs.73393) of SHC beneficiary farmers were higher than the mean index of productivity / ha (31.08) and income / ha (Rs.63186) of SHC non-beneficiary . It was also found that there was a change in productivity and income to the tune of 15.92 and 16.15 per cent over that of non-beneficiary farmers.

Because of adoption of SHC recommendations by beneficiary farmers, it resulted gain in high knowledge and adoption level by beneficiary farmers. They get better productivity per hectare of paddy crop and leads to increase their income per hectare.

It is observed from Table 10, that the mean of the various dimensions of impact namely

productivity (36.03) and income (Rs. 73393) of SHC beneficiary were higher than the mean of productivity (31.08) and income (Rs. 63186) of SHC non-beneficiary.

When impact as a whole was considered, it is seen from Table 10 that there was impact of 16.03 per cent of SHC programme. It could, therefore concluded that, there was definite positive impact of SHC programme on the farmers in terms of change in productivity and income to the extent of 16.03 per cent over and above as a whole.

In order to test the variability of mean index of productivity and income of beneficiary and non beneficiary farmers, the data were subjected to 'z' test and the results thus obtained have been presented in Table 11.

Table 10
Impact of SHC recommendations on productivity and income of the farmers

Sl. No.	Impact Dimension	Mean Index		Per cent change
		Beneficiary (n=60)	Non Beneficiary (n=60)	
1.	Productivity (Qtl./ha)	36.03	31.08	15.92
2.	Income (Rs./ha)	73393	63186	16.15
				16.03

A mere quantitative superiority of the mean index of beneficiary farmers over mean index of non beneficiary farmers is not conclusive proof of its superiority. Hence, the ratio between observed difference was computed as indicated by 'z' value.

The 'z' value of productivity (7.56) and income (7.55) were found to be significant at 0.01 level of probability.

It could, therefore be, inferred that the beneficiary farmers differed significantly over non beneficiary farmers in productivity and income. It could, therefore, the explicitly stated that, there was definite change in productivity and income of the farmers.

By and large, it could definitely be inferred that, the SHC programme had a positive significant impact on the beneficiary farmers.

Table 11
Testing the significance difference of the mean

Sl. No.	**Impact Dimension**	**Mean Index**		**'z' value**
		Beneficiary (n=60)	**Non Beneficiary (n=60)**	
1.	Productivity (Qtl./ha)	36.03	31.08	7.56**
2.	Income (Rs./ha)	73393	63186	7.55**

** ------ Significant at 0.01 level of probability

CONCLUSIONS

1. The findings of the present study concluded that, majority of the beneficiary of Soil Health Card (SHC) programme had possessed high knowledge level (90.00%) and adoption level (63.34%) of SHC recommendations than non beneficiary farmers.

2. Soil Health Card (SHC) programme had significant impact of 16.03 on beneficiary farmers in terms of change in productivity (15.92) and income (16.15) from paddy crop over non beneficiary farmers.

Thus, Soil Health Card programme is highly beneficial programme for sustainable growth in agriculture. It is therefore suggested that, if the non beneficiary farmers may get advantages of SHC programme it will help to increase their annual income.

RECOMMENDATION

Soil Health Card programme had impact of 16.03 per cent in terms of increase in productivity (15.92%) and income (16.15%) on the Paddy farmers. It is therefore, recommended that, Soil Health Card Programme should be effectively implemented for longer period to reach every farmer through extension functionaries.

REFERENCES

Bhatt, P.M., Patel, H.B. and Patel, B.M. 2013, A Study on awareness about Soil Health Card, Gujarat Journal of Extension Education, 20-21, 53-54.

Bera, Sayantan, 2015, 'A soil health card not enough for balanced fertilizer use', at

http: / / www.livemint.com / Politics / 1xM0dNr7g9BLYw5Rx45tvK / A-soilhealth-card-not-enough-for-balanced-fertilizer-use.html, August, Accessed on 9th February 2016.

Dohtare,P.N. (2014): Adoption of Soil Test Recommendations By the Paddy Farmers. M.Sc.(Agri.) Thesis (Unpub.),Dr. PDKV, Akola.

Elumalai, Kannan, 2016, Analysis of Farm Level Adoption of Soil Nutrient Management Technology by Paddy Farmers in Karnataka, A paper presented in the National

Seminar on "Role of Public Policy in Development Process (Emerging Economic / Social Scenarios in the Indian Economy)" held at SPIESR, Ahmedabad on 4th and 5th January, 2016.

Krishnaji. N., 1975, 'Inter-Regional Disparities in Per Capita Production and Productivity of Food Grains: A Preliminary Note on Trends'. Economic and Political Weekly, Vol.10, No.33 / 35, pp. 1377-85.

Mukati, A. 2016. Farmers? perception regarding soil health card- a study in Tikamgarh district of Madhya Pradesh. M.Sc.(Agri.) Thesis (Unpub), Jawaharlal Nehru Krishi Vishwavidyalaya, Madhya Pradesh.

Murgai, R., M. Ali and D. Byerlee 2001, 'Productivity and Sustainability in Post Green Revolution Agriculture: the Case of Indian and Pakistan Punjab'. The World Bank Research Observer, Vol. 16, No.2, pp.199-218.

Patel, G.G., Y.C. Lakum, Aakash Mishra and Bhatt, J.H. 2017. Awareness and Knowledge Regarding Soil Testing and Utility Perception of Soil Health Card. Int. J. Curr.Microbiol.App.Sci. 6(10): 329-334.

Pingali, P.L. and M. Shah, 2001, 'Policy Re-directions for Sustainable Resource Use: The Rice-Wheat Cropping System of The Indo-Gangetic Plains'. In The Rice-Whet Cropping System of South Asia: Trends, Constraints,Productivity and Policy,ed. P.K. Kataki, 103-18. New York: Food Products Press.

Rao, V. M., (1996), 'Agricultural Development with A Human Face: Experiences and Prospects'. Economic and Political Weekly, 31(26): A50-A62.

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