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Impact and performance of soil testing service in Betul district of Madhya Pradesh

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Abstract
Soil health and fertility is the basis for sustainable profitability of the farmers. Using optimal doses of fertilizers and cropping pattern as per the scientific recommendation is the first step towards sustainable farming. Soil testing is a science based and time-tested tool for assessment of soil fertility status and soil ailments and for nutrient amendment recommendations. Soil testing, as a tool for judicious fertilizer use, works on the principle of profitability, meaning if all other factors of production are at optimum and none of them limiting, there is all probability to obtain more profitable response to applied nutrients based on soil testing than those applied on adhoc basis. The report assess the impact of Soil Health card Scheme of Government of India. The paper has analysed the impact of Soil Health Card Scheme on farmers' income by studying the economics of cultivation of three major *kharif* crops paddy, soybean and maize in Madhya Pradesh. For study, data were collected from 30 soil tested farmers/beneficiaries before and after application of recommended doses of fertilizers (RDF). The study has found that yield of paddy, soybean and maize increased by 19.42 per cent, 13.79 per cent and 9.6 per cent, respectively after adoption of RDF. The net income per acre increased from 11231 to 17385 (54.8%) in paddy, from 6696 to 11228 (67.7%) in soybean and from 3380 to 8105 (139.8%) in maize after soil testing by the farmers. The BC ratio increased from 1.5 to 1.7 in paddy, from 1.6 to 2.0 in soybean and from 1.4 to 1.9 in maize on adoption of RDF by the farmers. Thus, soil health card scheme was found highly beneficial to the farmers in term of increasing their income. However, there is a need to generate awareness about the benefits of this scheme among the farmers on one hand and strengthening of soil testing services / laboratories on the other hand for a wider adoption of RDF.

Keywords: impact. awareness, knowledge & adoption, soil health card

1. Introduction
The soil health card (SHC) is a complete evaluation of the quality of soil right from its functional characteristics to water and nutrients content and other biological properties. It contains corrective measures that a farmer should adopt to obtain a better yield. The SHC helps the farmers as the farmers get a well monitored report about the soil and they are guided by the experts to improve soil health. It also helps the farmers to get crop-wise recommendations of nutrients and fertilizers required in each type of soil. This can help in increasing the crop yield. The SHC scheme was launched in February 2018, and by July 2019, more than 400 cards have been issued. Across the states in India, Madhya Pradesh leads in the distribution of the Soil Health Cards to farmers. The Madhya Pradesh states have collected the maximum number of soil samples for testing during the *kharif* season. Some other states which have shown lead Madhya Pradesh. In Madhya Pradesh, the SHC scheme is being implemented in all the districts through 400 soil testing labs (30 under State Department, 26 under Madhya Pradesh State Agriculture Marketing Board and 47 under Agricultural Universities) running under the control of State Agriculture Department. The soil testing is a proven scientific tool to evaluate soil fertility and recommending balanced nutrition to crops. However, the soil testing programme in India has failed to create the desirable impact on the farming community due to extremely poor coverage and delay in timely dissemination of fertilizers recommendation to farmers (Biswas, 2002) [1]. Considering all the above facts, the present paper has analysed the impact of soil test technology on economics in cultivation of major *kharif* crops in Madhya Pradesh.

2. Research Methodology
The study was conducted in districts Betul, of Madhya Pradesh, in which the SHC scheme was

implemented since its inception year 2018-20. For study, ten block from selected district, one village from each block and 400 soil tested farmers from each chosen village were selected randomly. An equal number of control farmers were also selected from the same villages. Thus, the study had 400 soil tested farmers/beneficiaries who reported on before and after implementation of SHC scheme. Three major *kharif* crops, viz. paddy, soybean and maize were taken to study the impact of soil test technology on farmers' income.

The information was collected through developed interview schedule from Betul district. The Betul district consist of ten blocks in namely Betul, Chicholi, Multai, Aamla, Prabhatpattan, Bhaisdehi, Athner, Sahpur, Ghodadongri and Bhimpur each block four panchayat were selected randomly and from each panchayat 10 soil health card holding farmers were selected randomly for collecting the information used in this study hence out of 40 panchayat a total of 400 farmers were interviewed and their response were analyzed by using statistical tools as under. The response of farmers was recorded who were due taught about importance of soil health cards in crop productions by KVK scientists through cumulative extension activates.

3. Results and Discussion

More than 10.59% farmer adopted the recordation of soil heath card up to the level of 75% and considered as full adoption., followed by 29.13% farmers who adopted the recordation in a range of 35-75% and considered and partial adoption. Where as 28.38% farmer have no adoption or adoption of less then 35% of technology and considered as no adoption.

Performance indicators/ parameters	Unit/ details
Age, Education, Size of Family, Social Status, Social Participation, Mass Media Exposure, Extension participation, land holding, house hold type, farmers income	Full adoption (above 75%) = 10.59% Partial adoption (35-75%)= 29.13% & No adoption (below 35%) = 28.38%

Table 1: Use of different variables in 400 farmers from 10 blocks, 40 panchayats @ 10 farmers from each Panchayat

Variables	Category	No of Respondents		Full adoption (Above 75%)		Partial adoption (35-75%)		No adoption (Below 35%)	
		No	%	No	%	No	%	No	%
Age	Young (18-35)	138	34.50	25	18.12	80	57.97	33	23.91
	Middle (36-55)	183	45.75	42	22.95	83	45.36	58	31.69
	Old (above 55 years)	79	19.75	11	13.92	27	34.18	41	51.90
Education	above graduation	15	3.75	10	66.67	3	20.00	2	13.33
	high school to graduation	175	43.75	26.	14.86	77	44.00	72	41.14
	below high school	120	30.00	11	9.17	51	42.50	58	48.33
	illiterate	90	22.50	3	3.33	30	33.33	57	63.33
Family size	small (up to 5 members)	221	55.25	25	6.25	71	17.75	125	31.25
	large (above 5 members)	179	44.75	19	4.75	100	25.00	60	15.00
Social Status	SC	28	7.00	2	0.50	4	1.00	22	5.50
	ST	49	12.25	1	0.25	11	2.75	37	9.25
	OBC	236	59.00	31	7.75	117	29.25	88	22.00
	Other	97	24.25	3	0.75	35	8.75	59	14.75
Social participation	yes	400	100	60.	15	156	39.00	184	46.00
Mass media exposure	yes	400	100	51	12.75	145	36.25	204	51.00
extension participation	yes	400	100.	61.	15.25	195	48.75	144	36.00
land holdin	marginal (<1 ha)	97	24.25	4	1.00	38	9.50	55	13.75
	small (1-2 ha)	111	27.75	9	2.25	63	15.75	39	9.75
	medium (2-4 ha)	133	33.25	13	3.25	71	17.75	49	12.25
	Large (> 4 ha)	59	14.75	7	1.75	29	7.25	23	5.75
Household Type	Kaccha	238	59.50	13	3.25	91	22.75	134	33.50
	Pakka	162	40.50	18.	4.50	67	16.75	77	19.25
Farmers Income	low(<1 lakh)	110	27.50	15.	13.64	72	65.45	23	20.91
	medium (1-2 lakh)	162	40.50	22	13.58	88	54.32	52	32.10
	high (> 2 lakh)	128	32.00	12	9.38	42	32.81	74	57.81
Over all adoption				19.76	10.59	69.84	29.13	70.80	28.38

3.1 Sources of soil sample collection

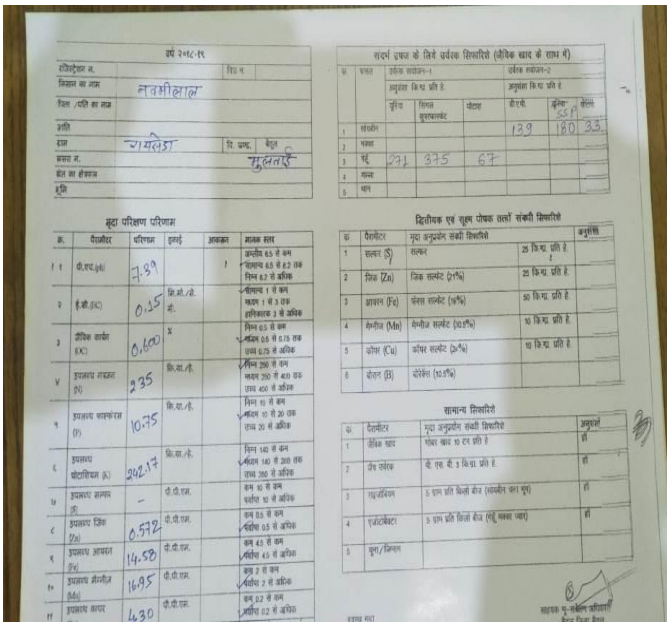
The majority of farmers were found to collect their soil sample by themselves (83%). Only 11, 5 and 1 per cent were found to collect their soil samples with the help of the farmer facilitator, scientists of SAUs, and KVKs respectively.

Hence, the present infrastructure of soil testing facility is found to be insufficient in different districts of Madhya Pradesh. There is an urgent need to increase capacity of soil sample testing. The Department of Agriculture ensures an effective and live linkage between the field and the laboratory. It will be appreciable if each lab may adopt at least one nearby village from where sample may be collected by the laboratory staff and recommendations are also communicated / handed over directly by the laboratory staff to the farmers and to follow the outcome of the SHC scheme. Each lab can take up one village as a mission to see the utility of the SHC scheme by itself and find out shortcomings so that the whole SHC scheme can be improved on the basis of such direct observation / study. Presently, the labs are literally cut off from the field and work in isolation of the whole SHC scheme. There is an urgent need to make the SHC available to the farmers in their finger tips with the help of information technology through internet and mobile. At the same time they should be made aware about these facilities so that it can be access it at any time anywhere, where ever it is required then only the purpose of soil testing can be fulfilled in a right

Table 2: Soil Science lab and Soil health card status in Betul District

Parameter	District (10 Block)	lab	Mini lab
Soil science lab	56	12	44
Distribution of soil health card (Year 2018-19)	1,50,000	25,000	1,25,000

Soil Health Card



Data of Soil health card

Fig 1: Knowledge level of 400 respondent about soil health card

The soil testing is a proven scientific tool to evaluate soil fertility and recommending balanced nutrition to crops. However, the soil testing programme in India could not achieve the desirable impact on farming community the desirable impact on the farming community due to extremely poor coverage and delay in timely dissemination of fertilizers recommendation to farmers (Biswas, 2002) [1]. Considering all the above facts, the present paper has analysed the impact of soil test technology on economics in cultivation of major kharif crops in Madhya Pradesh. The constraints reported by the farmers in adoption of recommendations included high cost, difficulty in adoption, low credibility of soil testing report, and long distance to laboratory (Chouhan *et al.*, 2012) [2]. There is ample scope to improve the analysing capacity as well as dissemination ability of soil testing laboratories. This, coupled with professional management through proper linkages, can bring radical changes in soil testing services in the state (Sharma *et. al.*, 2015) [3]. It is suggested that the issued SHCs need to be periodically updated so that the farmers remain aware about the changing fertility status of their land. The awareness generation regarding spraying, fertigation and drilling method of fertilizers application is also needed among the farmers. The advantages of adoption of recommendations of soil testing may be disseminated among the farmers along with strengthening of extension service delivery in the state.

4. Conclusions

The study has concluded that adoption of RDF as per SHC leads to reduction in the application of other inputs like seed, labour, pesticides, etc. (66.7%), improvement in soil texture (60.0%) and increase in crop yield (55.6%) were observed by the majority of households after the application of RDF. At the same time, they also started adopting the recommended package of practices (RPP) for cultivation of other crops as they got the opportunity to contact officials of the department of agriculture, scientists of SAUs and KVKs and farming facilitators resulting in reduction in expenditure on fertilizers and other inputs, thereby cost of cultivation. It could lead to increase in farmers' income.

5. References

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