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Impact and Utilization of Soil Health Card in *Kharif* Paddy in the State of Assam

Bhargab Baruah[1*], Nibir Pratim Choudhury[2] and Kangujam Bokado[3]

[1]Ph.D. Scholar, Department of Extension Education,

[2]MBA, Department of Agricultural Economics and Farm Management,

[3]Ph.D. Scholar, Department of Agronomy, Assam Agricultural University, Jorhat-785013, Assam

*Corresponding Author E-mail: bhargab23@gmail.com

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ABSTRACT

The present study was undertaken with a view to assess the impact and utilization of soil health card towards fertilizer consumption, yield and income of Kharif paddy in Assam. The study was conducted covering three districts viz., Karimganj, Cachar, and Morigaon. A comparative study was undertaken by randomly selecting 30 farmers with soil health cards and 30 farmers without soil health cards. The sample of farmers without soil health cards was considered as the control group. The results of the study revealed that there is a significant gap in utilization of recommended doses of fertilizers among the farmers of either group. The NPK consumption ratio for farmers with soil health cards was found to be 2.68:1.30:1 as against 4.63:3.08:1 for the farmers without soil health cards. The mean yield per hectare of Kharif paddy for the farmers with soil health cards was marginally higher than the control group. The net change in gross income between the two groups due to soil health cards was valued at Rs. 2178 per hectare. It could not be established that soil health cards had a bearing on the difference in gross income between the two groups as the recommended doses of fertilizers were not followed by the sample farmers. Thus, from the study it can be concluded that simply going through the process of distributing soil health cards without proper and scientific guidance by the extension machinery in the state is not going to ensure adoption of recommended doses of fertilizers.

Key words: *Soil health card, Fertilizer consumption, Yield, Income, Kharif paddy.*

INTRODUCTION

Soil provides for the basis of agriculture. Productivity and quality of crops depend largely on how the soil is managed by the farm. The soil management practices directly influence the soil health. A healthy soil provides all the essential nutrients for plant growth, apart from providing water and physical support to plants. Thus, soil health in relation to agriculture can be defined as the inherent capacity of the soil to respond to the agricultural management practices while maintaining its productivity, sustainability and profitability.

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As per the report of the Department of Agriculture and Cooperation, the existing NPK consumption ratio in India is skewed at 6.7:2.4:1 (2014-15) as against the preferred ratio of 4:2:1. Widespread secondary and micronutrient deficiencies have led to a deteriorated soil health which is the reason to low fertilizer response and crop yields in Rainfed areas of India. The degrading soil health trend can be reversed through a (Soil) science led approach of adoption of soil test based application of deficient secondary and micronutrients[1]. Soil testing is the only necessary and available tool for determining the amount of soil nutrients[2].

Generally blanket fertilizer recommendations are followed for NPK in the country which rarely matches site-specific soil fertility need, often ignoring the requirement of secondary and micronutrients in the cropping systems. Visualising the importance of site-specific integrated nutrient management, the soil health card scheme was launched by Ministry of Agriculture, GOI in February 2015. The soil health card is a simple report card, which contains the nutrient availability, and physical and chemical properties of soil of a particular farm based on chemical analysis of collected soil samples. Based on the soil test report, the soil health cards carry crop wise recommendations of fertilizers and micronutrients and also the needed soil amendments that are to be applied on farm for maintaining the soil health in the long run. The objective of the soil health card scheme is to promote balanced use of fertilizer, which is essential to stabilize crop yield and increase the income of the farmers in the country. Soil health card scheme has been highly beneficial to the farmers in terms of increasing their income[3].

In Assam, the cropping pattern has remained almost same over the last few decades. Rice is the most predominant crop in the cropping sequences followed in the state, accounting for almost 60% of gross cropped area. There is a considerable gap in the productivity of food grains attained in the state level to that of national average. This is primarily due to widespread dependence of farmers' of Assam on traditional cultural practices and very low use of nutrients. The average fertilizer consumption per hectare of cropped area in Assam was 44.79 kg during 2015-16 which is very low as compared to that of national average, which stood at 130.66 kg[4]. The issuance of soil health cards and the subsequent utilization of the information contained in it by the farmers shall help in achieving the yield potential of the state and increase the income of the farmers. As per report of the Directorate of Agriculture, Government of Assam 12, 00, 901 soil health cards were issued during Cycle –I of the scheme in the state that concluded in 2017.

The present study was undertaken in the state of Assam to-

1. To study the gap in utilization of recommended doses of fertilizers in kharif paddy in the state of Assam.
2. To assess the impact of soil health card on yield and income of *kharif* paddy in the state of Assam.

MATERIAL AND METHODS

The study was conducted in three districts Karimganj, Cachar and Morigaon of Assam in which soil health card scheme has been implemented. For study one block from each selected district, two villages from each block were purposively selected, one where soil health cards have been distributed by the respective Krishi Vigyan Kendra's (KVKs) of the selected districts and the other where soil health cards were yet to be distributed. From each selected village, a list of farmers cultivating paddy was prepared with the help of respective subject matter specialists in Soil Science of the KVKs of the selected districts. Random samples of 10 farmers were drawn out from each chosen villages. The group of farmers without soil health cards was considered as the control group. Thus, the total sample comprised of 60 farmers, 30 each from each group, from six selected villages. A comparative study was carried out between the

two groups of farmers with *Kharif* paddy as the reference crop, to study the impact and utilization of soil health cards in the three districts.

The primary data for the study at micro level were collected through personal interview of the selected respondents with the help of well-structured and pre-tested questionnaire. The survey work was carried out for the agricultural year 2017-18. Simple tabular analysis was used to examine the impact and utilization of recommended doses of fertilizers prescribed in the soil health cards distributed within the study area.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Respondents

Socio-economic characteristics of farmers are important parameters for determining the capacity of the farmers in understanding and utilizing scientific recommendations for achieving better returns from their farms while maintaining ecological sustainability. A comparative analysis of the socio-economics characteristics between the control farmers and the farmers with soil health cards, and their averages are presented in Table-1.

Table-1: Socio-economic characteristics of the respondents

Particulars	Farmers with Soil Health Cards (30)	Control Farmers (30)	Average (60)
Age (respondent)	48.06	47.22	47.64
Literacy Rate (per cent)	69.54	67.80	68.67
Experience in farming (years)	29.40	28.86	29.13
Land holding (ha)	0.68	0.59	0.64
Irrigated Land (%)	24.45	22.38	23.42

At overall level, the average age of the respondents was 47.64 years and the literacy percentage of the total sample was found to be 68.67 per cent. Each respondent had 29.13 years of experience in farming. The average land holding was 0.64 hectares and only 23.42 of the sample farmers had the facility for irrigation.

Utilization of Recommended Doses by SHC holders

Adoption of technology is the decision to make full use of a new idea as the best course of action available and involves a change in the orientation and behaviour of the farmer from the time he/she becomes aware of the technology to its adoption[5]. The extent of gap in average recommended dose of fertilizers as printed in soil health cards and actual level of fertilizer application by the farmers with soil health cards for high yielding variety of *kharif* paddy is presented in Table-2.

Table-2: Utilization of recommended doses of NPK fertilizers by SHC recipients

(Kg/ha)

Crop	Urea	DAP	SSP	MOP	FYM*
Average recommended quantity of fertilizers [as given in SHC]					
Kharif Paddy	130.86	-	142.85	74.80	9.75
Actual application of Fertilizers [farmers' opinion]					
Kharif Paddy	98.83	32.02	62.72	29.50	0.37

*The unit of FYM is in tonnes per hectare.

The average recommended dose of fertilizer for *kharif* paddy were FYM @ 9.75 ton/ha, Urea @ 130.86 kg/ha, SSP @ 142.85 kg/ha, and MOP @ 74.80 kg/ha. There was no recommendation against DAP in the soil health cards distributed by the KVKs. On the other hand, the farmers with soil health cards actually applied on an average FYM @ 0.37 ton/ha, Urea @ 98.83 kg/ha, DAP @ 32.02 kg/ha, SSP @62.72 kg/ha and MOP @ 29.50 kg/ha. It clearly indicates that there is a significant gap in utilization of

recommendations given in soil health cards by the farmers. Thus, it can be said that there is no impact of soil testing and customised fertilizer recommendation on actual fertilizer use or the willingness to pay for lacking nutrients. The factors such as lack of understanding, lack of confidence in the information's reliability or the costs of recommended fertilizer mixes could be the driving forces behind non-adoption of recommended fertilizer doses[6].

Comparison of crop yield and income for the farmers with soil health cards and the control group

Yield and income from per unit area of landholding is one of the crucial parameters to quantify the impact of soil health cards in the study area. The comparison between cost of fertilizer consumption, yield and gross income between the farmers with soil health cards and the control group in *kharif* paddy has been presented in Table-3. The data revealed that the average cost of fertilizers was marginally higher for the farmers with soil health cards as compared to the control group farmers. The average costs of fertilizers for per hectare crop of *Kharif* paddy were calculated at Rs. 3,777 and Rs. 3612 for the farmers with soil health cards and the control group, respectively, with a marginal difference of Rs. 165.

Table-3: Comparison of fertilizer consumption and income for SHC holders and control group in Kharif paddy crop (Per hectare)

Variables		With SHC		Control Group		Difference	
	Unit	Qty.	Value (Rs)	Qty.	Value (Rs)	Qty.	Value (Rs)
A. Cost of fertilizers							
Urea	Kgs	98.83	880	73.72	661	25.11	219
SSP	Kgs	62.72	501	22.56	179	40.16	322
MOP	Kgs	29.50	589	13.32	266	16.18	323
DAP	Kgs	32.02	1088	54.71	1886	-22.69	-798
FYM	Tonnes	0.36	719	0.31	620	.05	99
Total Cost			3777		3612		165
B. Return							
Main product Yield	Qtls	31.47	38549	29.97	36293	1.50	2256
By-product Yield	Qtls	4.89	992	4.54	905	0.35	87
Gross Income			39541		37198		2343
Net change in gross income							**2178**

As far as the NPK consumption ratio is concerned, it was 2.68:1.30:1 for the farmers with soil health cards as against 4.63:3.08:1 for the farmers of the control group. The difference in actual fertilizer use per hectare between the two groups was positive in case of urea (25.11 kg), SSP (40.16 kg), MOP (16.18 kg) and FYM (0.05 tonnes), and negative in case of DAP (-22.69 kg) for the farmers with soil health cards in comparison to the control group (Table 3).

As the recommended dose of fertilizers was not fully adopted by the sample farmers, the mean yield per hectare (31.47 Qtls.) for the farmers with soil health cards was only marginally higher *i.e. 1*.50 Qtls. valued at Rs. 2256 than the mean yield of the control farmers (29.97 Qtls.). There was also a marginal difference of 0.35 Qtls. valued at Rs. 87 in the yield of by-product, and the net change in gross income between the two groups due to soil health card was worked out at Rs. 2178 per hectare.

The farmers with soil health cards managed to get slightly higher yield and income than the control group. Since the respondents did not follow the recommended dose of fertilizers, the difference in yield and

yield cannot be fully credited as an impact of soil health cards. Some exogenous factors might have played its role in bringing about the difference.

CONCLUSION

From the study it can be concluded that it was too early to study the impact of soil health card in the study area. Farmers being very traditional in nature and with limited landholding cannot be expected to fully adopt the recommended dose of fertilizer with a year of receiving the soil health cards. However, it was observed that the pattern of consumption of fertilizers for the farmers with soil health cards differed from that of the control group. Thus, it can be inferred that the farmers with soil health cards have showed positive attitude towards adopting the recommendations given in soil health cards.

The adoption of the recommended doses in future will depend on the confidence of the farmers on the soil health card testing and distributing agency. Some of the deterrents for non-adoption of recommended doses maybe that the farmers were not aware of the process of soil testing and were not involved in the process of soil sample collection by the KVKs, the KVKs printed the soil health cards in English instead of using local language, and increase in cost of cultivation on adoption of recommended doses without any certainty in yield gain. Also, farmers evaluate any recommendation coming from the scientific community on the basis of their accumulated wisdom in farming they have acquired over the years through first-hand experience. As such, excluding DAP from the recommendations in the soil health cards and no surety of higher yield from following the recommendations make farmers skeptical about the utility of soil health cards.

It is suggested that the state government formulate policies on sale of fertilizers by the input dealers such that fertilizers are to be sold to farmers strictly as per the recommendations on the soil health cards, failing which the input dealers have to face penalties. Training programmes and demonstrations must be carried out locally to create awareness on the need for balanced fertilization to realize higher income on a sustainable basis. Without Proper and scientific guidance through well-organised training programmes and advisory services it would not be possible to achieve the desired impact of the soil health card programme.

Limitations

The study was conducted with a small sample size owing to time and resource constraints at the disposal of the author(s). Being a micro level study the findings may not be generalized, though they do give important indications towards the impact and utilization of soil health cards in the state of Assam.

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