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Evaluation of soil health card from user's perspective in Varanasi

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Abstract
Intensive farming practices in India, have virtually mined the nutrient from the soil especially in rice and wheat cropping pattern. During the Green revolution, food production increased, meanwhile the number of elements deficient in Indian soils increased from one (N) in 1950 to nine (N, P, K, S, B, Cu, Fe, Mn, and Zn) in 2005–2006 due to imbalanced fertilizer application. Farmers often apply a high dose of fertiliser to get maximum production. To overcome the problem of imbalanced application of fertilizers, Ministry of Agriculture and Farmer's Welfare, Government of India on World Soil Day, 2015 (5th December) launched the Soil Health Card (SHC) scheme. The SHC is a printed report which contains nutrient status of soil with respect to 12 nutrients: pH, Electrical Conductivity (EC),Organic Carbon (OC), Nitrogen (N), Phosphorus (P), Potassium (K), Sulphur (S), Zinc (Zn), Boron (B), Iron (Fe), Manganese (Mn), Copper (Cu). The present study is an attempt to understand the SHC from the User's perspective.

Keywords: Soil health card, green revolution, fertilizer

1. Introduction
With the commencement of the Green revolution, there has been competition for increasing cereals production. However, the production of cereals in-country is increased five-folds, and fertilizer consumption increased 332 folds from 1950 through 51 to 2007-08 with implicating low fertilizer use efficiency (Prasad, 2008) [3]. India has two per cent world's geographical area and 17 % of the world's population. With a growing population, food security is a perpetual problem in India. To provide a square meal to the population, the country will need more than 300 Tg (Million tonnes) of food grains annually to feed the 1.4 billion people expected to populate it by 2025 (Pampolino, 2007) [4]. Additional food grain has to be produced from the same land or even lesser land and scenario put pressure on the land for food grain production. To increase the food production farmers often use high dose nitrogen application without taking the phosphorus and potassium dose into the account. Nitrogen is highly soluble and leads to the visible leaching losses under upland conditions and denitrification under low land conditions. These losses have a deleterious effect on the soil, water and environment (Prasad, 2007) [2]. Balanced NPK fertilisation has received appreciable attention in India. Farmers, especially marginal farmers often apply only N. About 45% of Indian soils are deficient in S (Biswas *et al*., 2004) [1]. and 48% in Zn (Prasad, 2008) [3]. Prevalent deficiencies of S, Zn and B have led to the development of the new concept i.e. Soil Health Card (Singh *et al*., 2008) [5]. Soil Health Card (SHC) is an approach of supplying plants with nutrients to optimally match their inherent spatial and temporal needs for supplemental nutrients.

To overcome the problem of the blanket application of fertilizer and nutrient to get the maximum production. The Ministry of Agriculture and Farmers Welfare, Government of India introduced the Soil Health Card (SHC) scheme with an objective (i) to improve soil quality and profitability of farmers, (ii) employment generation for rural youth, (iii) update information on soil analysis and to provide soil testing facilities to farmers at their doorstep. SHC is a printed report which contains nutrient status of soil with respect to 12 nutrients: pH, Electrical Conductivity (EC),Organic Carbon (OC), Nitrogen (N), Phosphorus (P), Potassium (K), Sulphur (S), Zinc (Zn), Boron (B), Iron (Fe), Manganese (Mn), Copper (Cu) of farm holdings. SHC will be provided to all farmers in the country at an interval of 2 years to

enable the farmers to apply recommended doses of nutrients based on soil test values to realize improved and sustainable soil health and fertility, low costs and higher profits. A soil health card is a field-specific detailed report of soil fertility status and other important soil parameters that affect crop productivity.

The cropped area was divided into grids of 10 ha for rain-fed and 2.5 ha for irrigated and taken only one soil sample from each grid and test results will be distributed to all the farmers whose area was falling under the grid. The State Government will collect samples through the staff of their Department of Agriculture or the staff of an outsourced agency. The State Government may also involve the students of local Agriculture/Science Colleges. Soil Samples are collected generally two times in a year, after harvesting of Rabi and Kharif Crop respectively or when there is no standing crop in the field. 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 desired impact on the farming community due to extremely poor coverage and delay in timely dissemination of fertilizers recommendation to farmers (Biswas, 2004) [1]. Considering all the above facts, the present paper has analysed study impact of Soil Health Card from the user perspective.

2. Data and methodology

Varanasi is one of the administrative and political districts in the state of Uttar Pradesh. The study was conducted in five blocks of Varanasi; Arajiline, Baragaon, Cholapur, Pindara and Sewapuri. Within five blocks two villages from each block were randomly selected. From each village, 20 farmers were selected randomly for the study. We conducted a baseline survey in November. The baseline survey collected data on farmer characteristics (Such as age, gender, education, and total landownership), use of fertilizers (Quantity of applications of different types of fertilizers and nutrients).

3. Results and Discussion

The Soil Health Card scheme was launched to achieve sustainable farming and to revive the soil health. In this section, we compiled all result after collection and statistical analysis of primary data. The total respondents for the study were 200. The male respondents were 160 and females respondents were 40. In our study, 80 % of respondents were male and their average age was 47 years. In our sample size, 137 farmers (68.5%) have a Soil Health Card. We also found only 19 women have Soil Health card. The study also found more than 70% of respondents were literate.

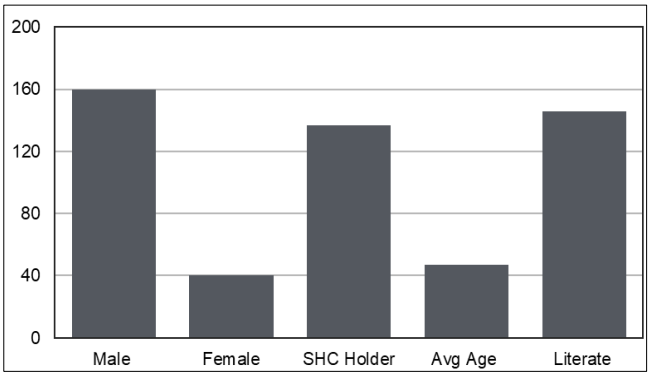

Fig 1: Descriptive statistics of respondents (n=200)

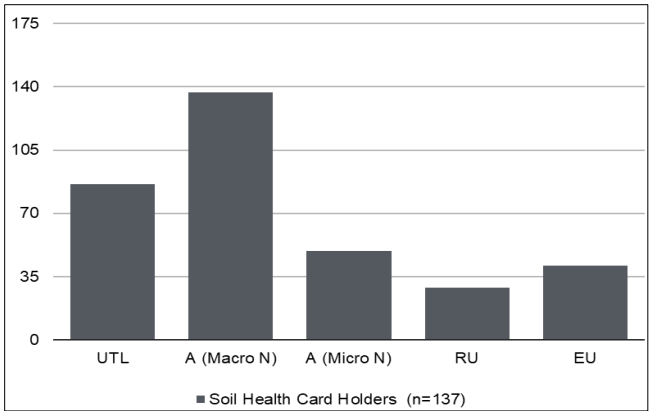

Fig 2: Characterisation of respondents' on various variables.

* UTL: Understanding of technical knowledge on Soil Health card, A (Macro N): Awareness about macronutrients such as Nitrogen, Phosphorus, Potassium and Sulphur etc., A (Micro N): Awareness about micronutrients such as Boron, Nickel, Zinc, Copper and RU: Recommendations useful and EU: Easy to understand soil health card recommendation.

We found in our study 86 farmers (62.77 %) have an understanding of technical language such as Organic Carbon (OC), Electrical conductivity (EC). 100 per cent of farmers were aware of the macronutrients but only 49 farmers (35.76 %) aware of the role of micronutrients. Only 22 per cent of farmers found a recommendation useful for their field. Farmers had difficulty in differentiating between the fertilizer recommendation and nutrient recommendation. Usually, farmers assumed that potash implies the use of Muriate of Potash (MOP). Same found in nitrogen where farmers assumed nitrogen deficiency implies the application of Urea (Also contain potassium and phosphorus).

Why did farmers ignored Soil Health Card?

Our results suggest that the SHC recommendations were not useful to farmers. There are three possible explanations (i) Simply farmers did not understand the content of the SHC (ii) farmers understood the contents of the SHC but did not find the soil analysis and fertilizer recommendations to be reliable or compelling (iii) lack of trust on samples which were collected from the field in their absence. Some farmers have reported they applied very less fertiliser quantity even less than recommended due to prices, liquidity, time or timely availability of specific fertilizers. The soil health card is more focused on chemical nutrient indicators; among physical and biological properties only soil colour is included. Some more physical properties like slop of the land etc. need to be incorporated. At least one or two physical and micro-biological indicators (Such as soil texture, water holding capacity, water quality and bacterial content) need to be incorporated.

4. Conclusion

The Soil Health Card Scheme has launched to addresses the rampant fertilizer misapplication in India. The Scheme impact has been constrained by procedural implementation issues and inadequate farmer adoption. Less than 50 per cent of soil testing labs in India are equipped with micronutrient testing facilities. This labs infrastructure is inadequate, strengthening and upgrading at least one soil testing lab per district as a state-of-the-art lab should be the priority. Many farmers reported they received the SHC after sowing of the

crop. Many farmers complained about the understanding of scientific parameters. Need of training program that educates extension officers and other staff on how to interpret results and explain results to farmers which could help in enhancing user's understanding of these cards. The ultimate objective of this program is to bring behavioural change in input application and end-users get the information in the protocol they understand and build trust on the source and data.

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