



SOIL HEALTH CARD: A STEP TOWARDS SUSTAINABLE AGRICULTURE

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Agriculture is an important sector of the Indian economy and accounts for nearly 17 percent share in the GDP. Introduction of high-yielding, semi-dwarf wheat and paddy varieties during the Green Revolution in the 1960s has changed the foodgrain production scenario of India and aided in the country's self-sufficiency to ensure the food security of its population. High yielding variety crops require large amounts of chemical fertilizers and water to produce good yields. However, the imbalanced use of chemical fertilizers over the years has deteriorated soil's physical, chemical, and biological health. It is reported that the nutrient balance of Indian soils is gradually declining @12-14 million tons per year (Source: <https://pib.gov.in/PressReleseDetailm.aspx?PRID=1603569>).

Currently, Indian soils are deficient in various important soil nutrients, viz., 95%, 94% and 48% respectively for N, P and K (macronutrients); 25% for S (secondary nutrients) and 41%, 20%, 14%, 8% and 6% respectively for Zn, B, Fe, Mn and Cu (micronutrients) (PIB, 2020: release 1603569). These limiting nutrients hamper the expression of other nutrients, resulting in the reduction of efficacy of chemical fertilizers and crop productivity. In fact, improvement of input use efficiency of fertilizers and nutrients is more important in Indian agriculture than applying higher doses of fertilizers. Currently, nutrient use efficiencies of several soil nutrients are very low like 30-50% for N, 15-20% for P,

60-70% for K, 8-10% for S and 1-2% for micronutrients. Although, crop production in India has been increased by many folds, imbalanced use of chemical fertilizers has deleterious effects on important natural resources, especially soil and water. To address such issues, the government of India, during the 12th five-year plan, implemented National Mission for Sustainable Agriculture (NMSA) in 2014-15.

Soil Health Management (SHM) is one of the key components of NMSA. It aims to promote integrated nutrient management through soil test based balanced application of primary, secondary macronutrients and micronutrients in combination with organic manure and bio-fertilizers. Under the SHM component, the central government has launched the Soil Health Card (SHC) scheme on 19th February, 2015 to encourage site specific and soil test-based integrated nutrient management to boost nutrient use efficiency. It facilitates the judicious application of chemical fertilizers along with bio-fertilizers and organic manure to maintain soil health and sustain crop productivity.

Under this programme, required infrastructures are also being developed. Presently, there are 3887 soil testing laboratories all over India. State and union territories wise distribution of STLs presented in Figure 1. Apart from these laboratories, different ICAR institutes also serve as soil testing/analysis facilities.

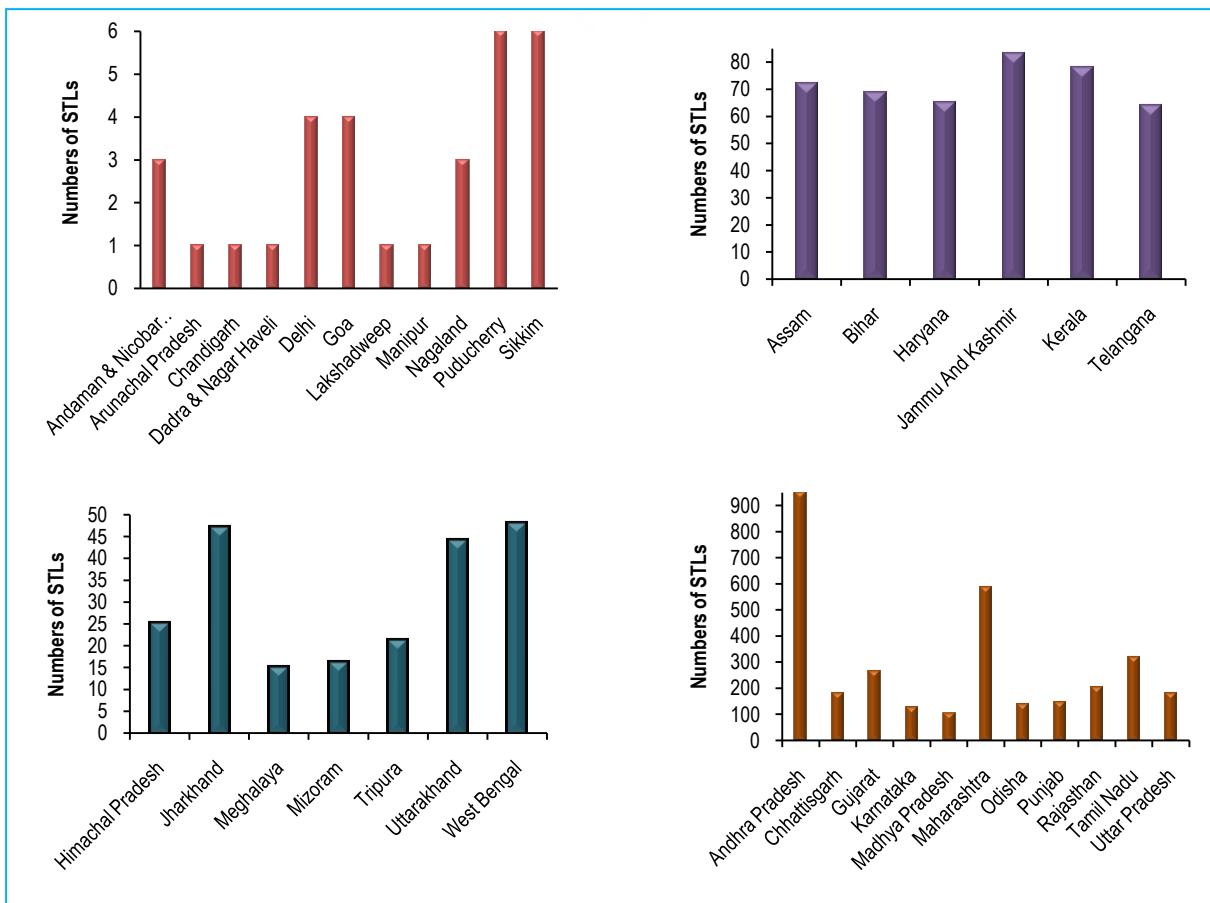


Figure 1. Soil testing laboratories in different States and Union Territories (sources: <https://farmer.gov.in/stl.aspx>)

In this SHC scheme, soil fertility status is assessed based on the presence of some important primary (N, P and K) and secondary (S) macronutrients, micronutrients (Fe, Zn, Cu, Mn and B) and values of some soil physical parameters like electrical conductivity (EC), pH and organic carbon content. Based on that information, SHCs are issued to individual farmers along with appropriate dosage of fertilizers for different crops grown in their farmland.

In the first phase (2015-2017) and second phase (2017-2019) of the SHC scheme, 107.4 million and 114.5 million cards were distributed respectively. The programme has been started in mission mode to encourage farmers in the use of prescribed doses of fertilizers according to SHCs issued to them. In the current phase, model villages are established in 6,954 different blocks across India under SHC scheme (Figure 2).

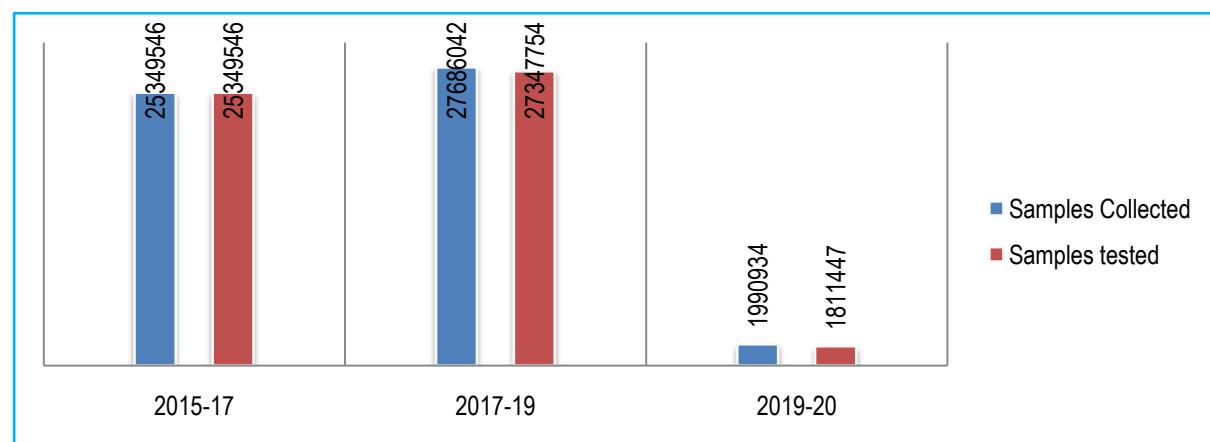


Figure 2. Year wise number of samples collected and tested in Soil Health Card Schemes (2019-20* tested under model village programme) (sources: <https://soilhealth.dac.gov.in/publicreports/dashboardtargetreport>)



Grid based as well as individual holding level based analyses are also being carried out along with SHC-based recommendations of fertilizer doses to increase awareness among farmers.

SOIL HEALTH CARD (SHC): HOW TO READ THE STATUS OF OUR SOIL?

The SHC is a printed report card issued to farmers in every 2 years containing information on 12 parameters obtained after testing of soil samples in laboratories (Table 1). Grid based sampling methodology is followed here and grid size for irrigated and rain-fed areas are 2.5 ha and 10 ha respectively. Soil samples are collected using GPS and revenue maps.

Table 1. Parameters in Soil Health Cards and their critical limits

S. No.	Parameters	Limits		
		Low	Medium	High
1	pH (1:2)	< 6.5 Acidic	6.5-7.0 Neutral	> 7.0 Alkaline
2	EC (1:2)	< 4.0 (Normal)	> 4.0 (Saline)	
3	OC (%)	< 0.50	0.50-0.75	> 0.75
4	N (kg ha^{-1})	< 280	280-560	> 560
5	P (kg ha^{-1})	< 10	10-25	> 25
6	K (kg ha^{-1})	< 120	120-280	> 280
7	S (mg kg^{-1})	< 10 deficient	> 10 sufficient	
8	Zn (mg kg^{-1})	< 0.6 deficient	> 0.6 sufficient	
9	Cu (mg kg^{-1})	< 0.2 deficient	> 0.2 sufficient	
10	Fe (mg kg^{-1})	< 4.5 deficient	> 4.5 sufficient	
11	Mn (mg kg^{-1})	< 2.0 deficient	> 2.0 sufficient	
12	B (mg kg^{-1})	< 0.5 deficient	> 0.5 deficient	

[pH and EC (1:2) soil water suspension, N (alkaline KMnO_4), P (Olsen), K (1N NH_4OAc), S (CaCl_2), cationic micronutrient (DTPA), B (hot water)]

After collecting relevant information, field-specific detailed report cards are prepared. Information provided in the Soil Health Card include (1) Present soil nutrient status of the selected field (2) Crop specific recommended doses of different fertilizers (3) Suitable amendment measures for saline or alkaline soil (4) Advisories regarding integrated nutrient management

A portal on soil health ([www.soilhealth.dac.gov.in](https://soilhealth.dac.gov.in)) has been prepared by the National Informatics Centre (NIC) for preparing uniform soil health cards. Separate

modules regarding soil sample registration, testing of samples in laboratories, recommendation fertilizer recommendations etc. are incorporated in this portal. Currently, SHCs can be printed in 23 major languages (Assamese, Bengali, Bodo, Dogri, English, Gujarati, Hindi, Kannada, Kashmiri, Konkani, Maithili, Malayalam, Manipuri, Marathi, Nepali, Odiya, Punjabi, Sanskrit, Santhali, Sindhi, Tamil, Telugu and Urdu) and 5 dialects (Bhojpuri, Garo, Khasi, Kumauni and Mizo).

According to a study conducted by National Productivity Council (NPC) in 2017, use of chemical fertilizers has declined by 8-10% due to this SHC scheme, resulting in higher sustainability in agricultural practices. Therefore, overall increase in the crop yield by 5-6% is reported. The SHC programme is an innovative step towards improving soil health for healthy crop growth. To perform soil testing at the village level, different farmer interest groups are also formed in different parts of the country like 'Raithu Bharosa Kendras (farmers' trust centres) of Andhra Pradesh to perform integrated testing of several components including soil, 'Mitti ke Doctors' in Jharkhand to provide soil test results and other interventions at farmers' doorsteps and also to encourage them for optimum use of fertilizers and pesticides for a better crop production (Source: <https://indianexpress.com/article/opinion/columns/integrated-nutrient-management-soil-health-cards-for-sustainable-agriculture-6276545/>)

CONCLUSION

SHC recommendation based fertilizer application has multiple benefits like enhanced soil quality, production of nutritious food, climate change mitigation along with reduction in water pollution due to chemicals etc. Also, collaborative efforts of government and non-government agencies in the promotion of SHC based balanced fertilizer recommendation make farmers aware about its importance for the progress of Indian farming system towards "Swasth Dhara, Khet Hara".

FOR FURTHER READING

Visit: <https://soilhealth.dac.gov.in>
