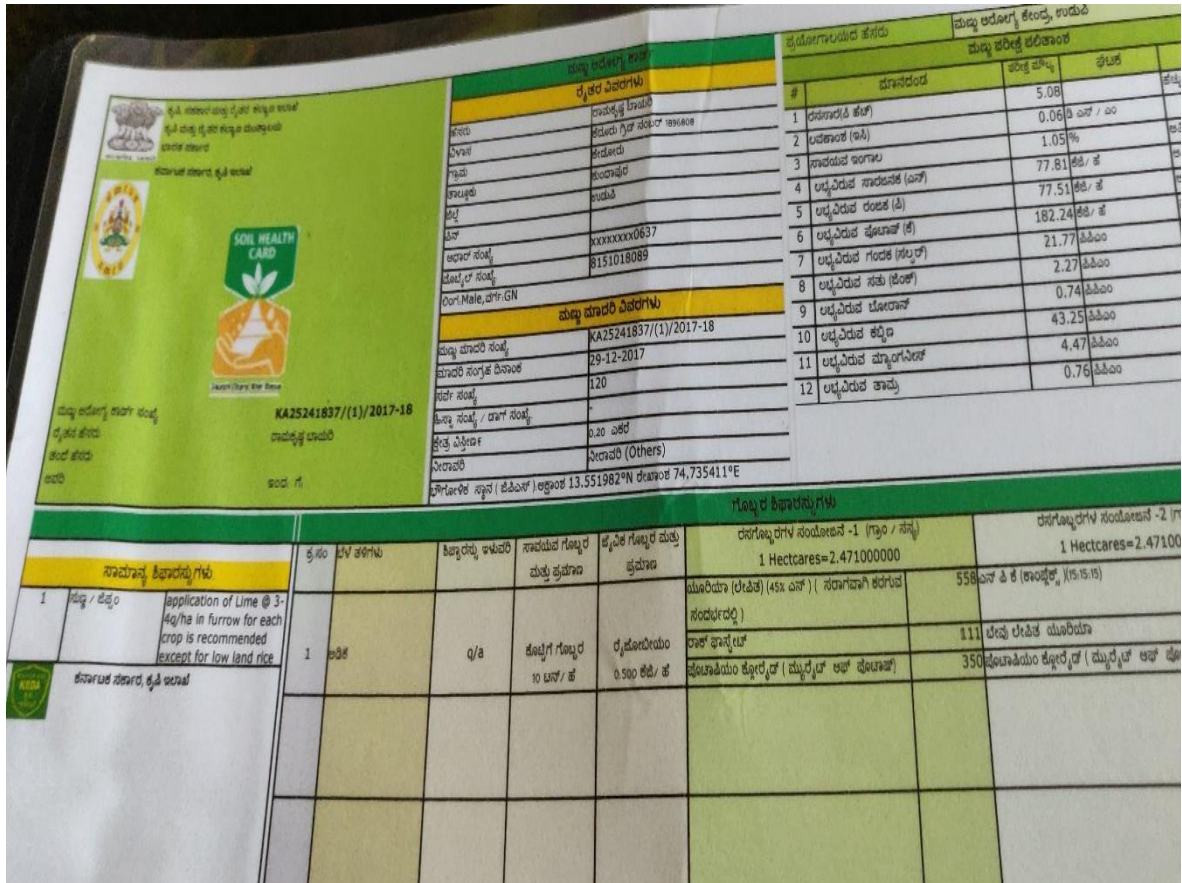


Study of Soil Health card on reduction of farm input cost



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Prepared by:
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Disclaimer

This Study Report has been prepared by B Satish Rao, Faculty Member, National Bank Staff College (NBSC), Luck now based on the field study conducted by him from 21 to 25 January 2019 in Karnataka. The views expressed in the report are that of the author. It does not necessarily represent or reflect the policy or view of National Bank Staff College (NBSC) or National Bank for Agriculture & Rural Development (NABARD). NBSC and NABARD accept no financial liability or any

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- Mattu FPO, Mattu, Kaup, Udupi
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Executive Summary

Land serves as the repository of nutrients and water for plants, which are crucial for cultivating different crops. Demand for non- agricultural purposes are also putting pressure on limited land resources. Soil formation and erosion are simultaneously occurring natural processes; however the former takes hundreds years whereas the latter can destroy within minutes. The challenge of management of these natural resources is evident from the fact that with mere 2.4 percent share of the world's land and only 4.0 percent share of the world's fresh water resources, the agriculture sector of India has to cater to 17.5 per cent of the world's population.

Soil and water resources are backbone of Indian Agriculture. Conservation, management and judicious use of these resources especially in rainfed areas is of utmost important for sustainable livelihood and food security of 2/3 of Indian population which depend on agriculture as a livelihood activity. The ever increasing pressure of human and livestock population in the country is a major cause of shrinking as well as fast deterioration of natural resources like soil, water, genetic resources and forestry.

Efficiency of inputs like fertilizer, pesticides are also low owing to their indiscriminate use, weak extension and services and inadequate infrastructure. In India, the current (2015) consumption of NPK ratio is 6.7:2.4:1, which is highly skewed towards nitrogen as against ideal ratio of 4:2:1. India is spending (2015) nearly Rupees Seventy thousand crore on fertilizer subsidy every year. According to the estimates, subsidy amount is about Rs.5000/ha of net cropped area and about Rs.5100/farmer resulting in excessive use of fertilizers, especially NPK at the cost of micro-nutrients and manure. Hence, there is a need for balanced use of fertilizers, keeping this government of India introduced Soil Health Card Scheme across India.

In view of the unique features of SHC scheme, the study was undertaken.

Based on the study findings, the following suggestions are made for different stakeholders:

Farmers

- i. As on the date of visit, farmers were applying fertilizers, without actually knowing the availability of nutrients in soil. The problem has aggravated due to intensive cropping systems followed by farmers.
- ii. Government of India, has created database of soil fertility of different regions. This gives the macro-view of nutrients in the region and help State Governments to plan soil ameliorating measures in cases of problematic soils (like acidic and saline conditions).
- iii. There is a need for more involvement of farmers in the scheme. Awareness programmes for farmers have to be undertaken compulsorily before collection of samples. Samples should be collected invariably with the involvement of concerned farmer and SHCs may be distributed within a specified period to the concerned farmer.
- iv. As on the date of visit, farmers depend on Agricultural Department for soil ameliorating measures suggested in soil health cards like application of lime, dolomite, etc.,(for acidic soils), etc. Over a period of time, the dependency can be reduced if FPOs, PACS, etc., are involved in providing these ameliorating inputs.
- v. In the era of increasing fertilizer prices, there is a need to use fertilizers judiciously. This may help the farmers to reduce the cost of cultivation to make agriculture remunerative even when the prices for the farm produce are low.
- vi. Farmers generally do not apply micro- nutrients in normal course of time. Soil health card give information about micro- nutrients. The response for application of minor nutrients (zinc, boron, sulphur, etc.) is more than major nutrients (N, P, and K). Hence, soil health cards have become a good tool to increase the yield of crops.
- vii. Blind application of fertilizers sometimes leads to toxicity. Use of soil health cards helps to reduce the chances of toxicity and increases the chances of balanced nutrient availability in soils.

Agricultural Department- district Level

- i. Soil Health Card (SHC) scheme of Government of India was able to establish soil testing laboratories at district level. This will help over a period of time.
- ii. Soil samples are collected by the trained personnel of Department on village basis, without much involvement of farmers. As the SHC has to be used by farmers, their involvement need to be of paramount importance while collecting the soil samples.
- iii. The Department is spending a lot of money on printing of SHCs. Sending the report directly to farmers in soft form (WhatsApp, email, etc.) could be explored.
- iv. As on the date of visit, the response time from soil sampling to receipt of report was high (sometimes as high as 2 years). There is a need to reduce the response time.
- v. The Department should also create awareness among fertilizer dealers about the utility of SHCs and advise them to supply fertilizers and other inputs as per SHCs.

ICAR Institutes/ KVKs

- i. SHC scheme has created a database of soil health status of the region; but farmers would like to have specific information about their field. These institutions can provide choices for the farmers with regard to soil testing.
- ii. ICAR institutes/ KVKs have progressive farmers in their fold. These progressive farmers can play a role in educating other farmers about the use of SHCs.

PACS, FPOs, FCs, SHGs

- i. SHC scheme is for the benefit of farmers and over a period of time this will help farmers to reduce the cost of inputs.
- ii. As on date, the Department is not involving these institutions due to accountability issues.
- iii. PACs which are supplying fertilizers may think of providing discount (say 1 %) if any farmer brings and uses SHC while purchasing fertilizers.

- iv. PACS & FPO can think of supplying micro- nutrients if deficiencies are observed in large scale in the fields of farmers/ members.

State Government- Agricultural Department -

- i. There is a need for more involvement of farmers in SHC scheme, as the farmer has to finally use the SHC to bring changes. As on date, involvement of farmers is minimum.
- ii. The involvement of fertilizer dealers in SHC scheme is minimum. There is a need to involve them in the scheme. Even Government can think of making it obligatory for them to supply fertilizers based on SHC information.

Central Government

- i. The grid of 25 acre in dry land and 2.5 acre in irrigated area too large for many farmers as more than 85 % of farmers are small and marginal farmers. There is a need a make scheme farmer- wise in case of small and marginal farmers.
- ii. The definition of irrigated area needs to change. Agricultural land covered under canal irrigation is considered as irrigated area. As on date, area covered under dug well/ bore well is considered as dry land areas.
- iii. There is need to involve farmers from the beginning of the scheme. As on date, the trust level among farmers is low about the scheme.
- iv. There is a need to involve the fertilizer dealers formally in the scheme. Use of SHC while purchasing fertilizers may be made compulsory within a defined period of time.

I. INTRODUCTION

1. Land Resources- Limited

Land serves as the repository of nutrients and water for plants, which are crucial for cultivating different crops. Demand for non- agricultural purposes are also putting

pressure on the limited land resources. Soil formation and erosion are simultaneously occurring natural processes; however the former takes hundreds of years whereas the latter can destroy within minutes. The challenge of management of these natural resources is evident from the fact that with mere 2.4 percent share of the world's land and only 4.0 percent share of the world's fresh water resources, the agriculture sector of India has to cater to 17.5 percent of the world's population.

Soil and water resources are backbone of Indian agriculture. Conservation, management and judicious use of these resources especially in rainfed areas is of utmost importance for sustainable livelihood and food security of 2/3 of Indian population which depends on agriculture as a livelihood activity. The ever increasing pressure of human and livestock population in the country is a major cause of shrinking as well as fast deteriorating natural resources like soil, water, genetic resources and forestry.

Significant shift in land use has been witnessed over the decades mainly due to ever increasing population and need of land for non-agriculture uses. A sample of this shift over a period of 10 years from 2003-04 to 2013-14 is the indication of the future scenario and pressure on the land resource of the country. Although net sown area and cropping intensity has increased the "climatically and socially significant buffer land" under categories such as culturable waste land, fallow land other than current, current fallow land, pastures and grazing lands declined significantly due to demand from non- agricultural sectors. Highest increase of 9.8% was recorded under land put to Non-Agriculture use.

Utilization of natural resources without deterioration for a sustainable production of food and other agricultural crops is a major challenge. This is compounded by the fact that Indian agriculture is largely weather dependent with full of uncertainties. Major challenge of enhancing crop production is how to increase productivity in the face of low resource use efficiency. Irrigation that shares more than 80% of public investment in agriculture has not shown much improvement in its efficiency due to various factors. There is a need to increase irrigation efficiency to reduce wastage of water, nutrients and land (due to drainage issues).

2. Fertilizer use

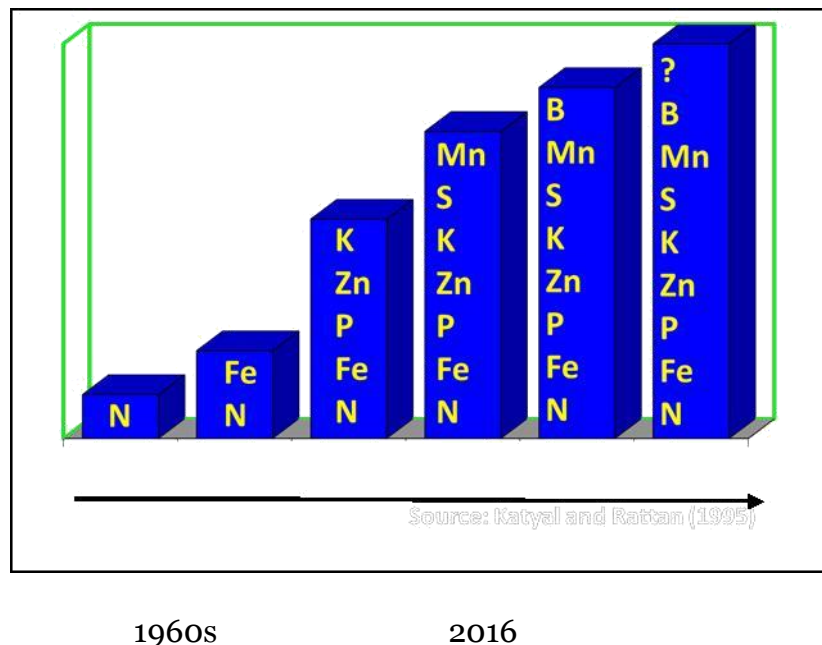
Efficiency of inputs like fertilizer, pesticides are also low owing to their indiscriminate use, weak extension and services and inadequate infrastructure. In India, the current (2015) consumption of NPK ratio is 6.7:2.4:1, which is highly skewed (Table- 1) towards nitrogen as against ideal ratio of 4:2:1. India is spending (2015) nearly Rupees Seventy thousand crore on fertilizer subsidy every year. According to the estimates, subsidy amount (NPK) is about Rs.5000/ha of net cropped area and about Rs.5100/farmer resulting in excessive use of fertilizers, especially NPK at the cost of micro-nutrients and manure. Hence, there is a need for balanced use of fertilizers. Keeping this in view, Government of India introduced Soil Health Card Scheme across India (GoI, 2017).

Table- 1: Consumption of Fertilisers in million tonnes in India

	Million tonnes					NPK -Ratio		
Year	N	P	K	Total	Year	N	P	K
1956	0.1	0.0	0	0.1	1956	10.4	1.3	1
1981	3.7	1.2	0.6	5.5	1981	5.9	1.9	1
1991	8.0	3.2	1.3	12.5	1991	6	2.4	1
2001	10.9	4.2	1.6	16.7	2001	7	2.7	1
2011	16.6	8.0	3.5	28.1	2011	4.7	2.3	1
2015	16.9	6.1	2.5	25.6	2015	6.7	2.4	1

India is consuming about 25.6 million tonnes of fertilizers, mostly Nitrogen (17 million tonnes) followed by Phosphorous (6 million tonnes) and Potassium (2.5 million tonnes). The current NPK ratio is 6.7:2.4:1, which is highly skewed towards Nitrogen as against ideal ratio of 4:2:1 (Table -1). There are wide variations across the states, in terms of fertilizer use per acre and NPK ratios.

Picture- 1: Progressive expansion in the occurrence of nutrient deficiency



As a result of the excessive and unbalanced use of fertilizers, the amount of food grain produced per kg of fertilizer applied declined from 13 kg in the 1970s to just 4 kg by 2010. In order to promote balanced use of fertilizers, Government of India has introduced Soil Health Card Scheme across India.

3. Need for SHC

There are many farmers in India who do not know which types of crops they should grow to get maximum yield. Basically, they do not know the quality and the type of their soil. They might know by experience what crops grow and what crops fail. But they don't know what they can do to improve the condition of the soil.

SHC is used to assess the current status of soil health and, when used over time, to determine changes in soil health that are affected by poor land management. A Soil Health Card displays soil health indicators and associated descriptive terms.

4. Soil Health Card (SHC) scheme

The SHC scheme has been approved for implementation during the remaining period of the 12th plan (from 1 April 2014). The scheme aims to provide SHC to all farmers in the country at a regular interval of two years to enable the farmers to apply recommended dosages of nutrients to realize improved and sustainable soil health and fertility status and to reap higher profits. The scheme has the following objectives:

- a) To improve soil quality and profitability of farmers.
- b) Employment generation for rural youth.
- c) To improve timelines in the analysis of soil samples.
- d) Introduction of single window approach from collection to issue of SHC minimizing delays and maximize convenience to farmers.
- e) Online delivery of SHC to the farmers using soil health card portal.
- f) Provide soil testing facilities to farmers at their doorstep.

II. Objectives of Study and Methodology

Study Objectives

Keeping in view the issues discussed above, the present study on '**Soil Health card on reduction of farm input cost**' was undertaken with the following objectives:

- Suggesting ways to improve the trust of farmers on Government agencies.
- Suggest measures to improve the efficacy of SHCs.
- Explore the possibility of use of SHCs in soft form.
- Explore the possibility of a role for FPOs, FCs, PACs, etc., for proper use of SHCs.

Methodology & Approach of study

Study Area

Soil Health card scheme of Government of India is implemented throughout India by the concerned State Agricultural Departments. Karnataka is one of the states which have given top most priority for issue of soil health cards and hence Karnataka was selected for the study. To cover all the major crops like field crops, vegetables, plantation and fruit crops, Dakshina Kannada and Udupi districts were visited for understanding field scenario in implementation of the scheme. Further, discussions were held with Agricultural Department, University of Agricultural Sciences and Indian Institute of Horticultural Research in Bangalore. During field visits, discussions were held with farmers, progressive farmers, KVKs, PACS, FPOs in selected places of two districts.

Data Collection

Secondary data about the progress made under the scheme was collected from the dedicated portal of Government of India (<https://soilhealth.dac.gov.in/Content/blue/soil/index.html>) of the SHC scheme. Discussions were held with farmers (both who got cards and who did not get the cards) to understand the utility of soil health cards.

Discussions were also held with Agricultural Department officials (both at Mangalore and Udupi), Directors of PACS, Directors of FPO, Farmers Club, KVK, Agricultural University, Indian Institute of Horticultural Research (IIHR) to understand ground reality about the implementation of the scheme. Discussions were also held with these

agencies with regard to sampling, involving farmers, testing, and distribution of SHCs and use of SHCs and measures / suggestions to improve the SHC.

Study Team

The study was undertaken by Shri B. Sathish Rao, Faculty Member at National Bank Staff College, Lucknow. Shri. Ramesh Srinivasan, DDM, Dakshina Kannada joined the study during the visit to CPCRI on 22 January 2019. DDM, Dakshina Kannada coordinated visits to different places in Dakshina Kannada and Udupi districts. The study was conducted from 21 to 25 January 2019.

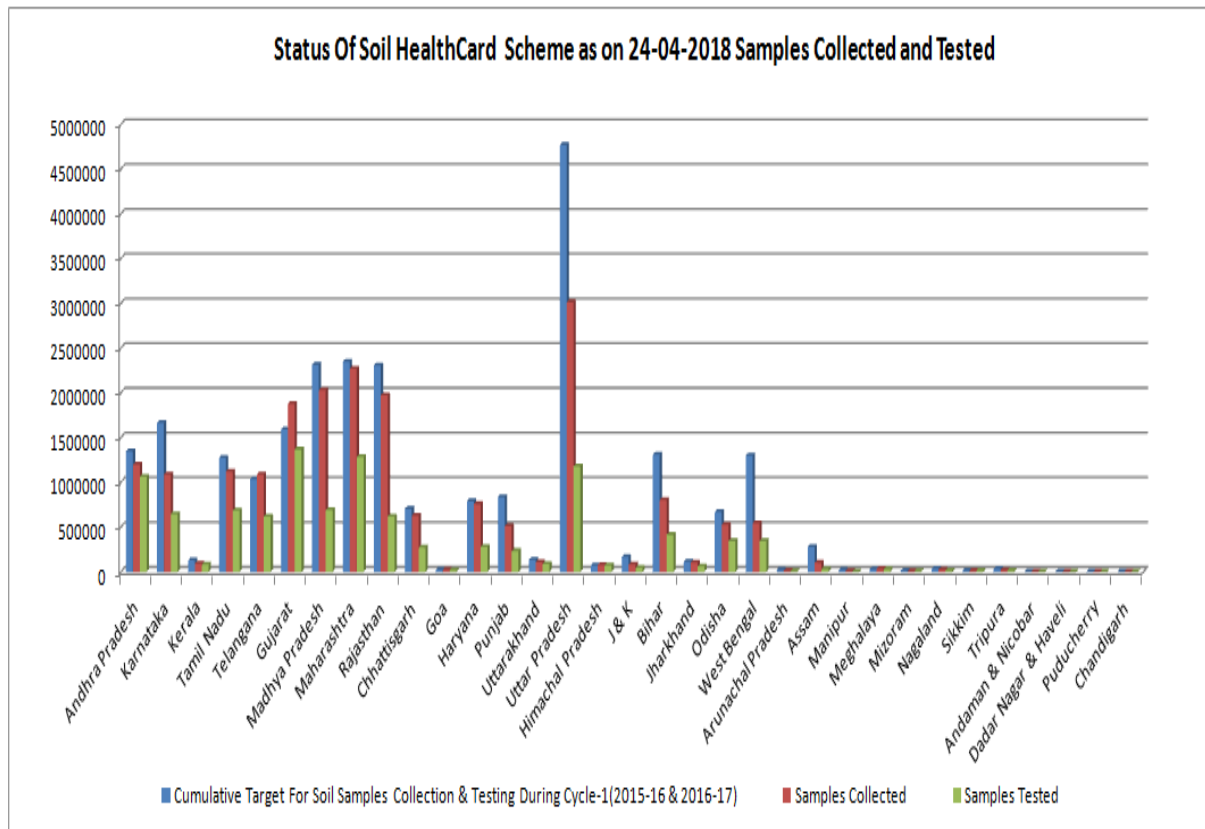
III. Observations

The major observations of the study focussing major stakeholders are summarised below:

I. Soil Health Card (SHC) scheme – Government of India

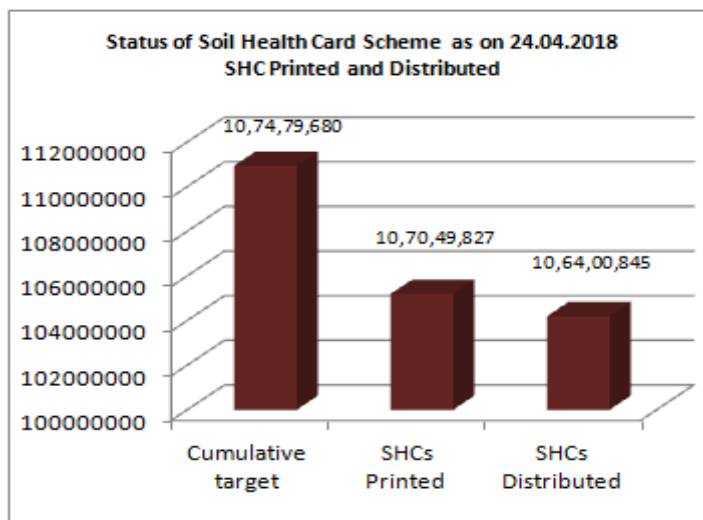
- i. Government of India has been implementing “National Mission for Sustainable Agriculture (NMSA) since 12th Plan (from 01 April 2014) with the objectives to make agriculture more productive, sustainable and climate resilient; to conserve natural resources; to adopt comprehensive soil health management practices; to optimize utilization of water resources; etc. “Soil Health Management (SHM) is one of the most important interventions under NMSA. SHM aims at promoting Integrated Nutrient Management (INM) through judicious use of chemical fertilisers including secondary and micro nutrients in conjunction with organic manures and bio-fertilisers for improving soil health and its productivity; strengthening of soil and fertiliser testing facilities to provide soil test based recommendations to farmers for improving soil fertility; ensuring quality control requirements of fertilisers, bio-fertilisers and organic fertilisers under Fertiliser Control Order, 1985; upgradation of skill and knowledge of soil testing laboratory staff, extension staff and farmers through training and demonstrations; promoting organic farming, etc.
- ii. Soil Testing laboratories were established to test soils with respect to 12 parameters, namely – N, P, K (Macro-nutrients), S (Secondary-nutrient), Zn, Fe, Cu, Mn, B (Micro-nutrients) and pH, EC, OC (Physical Parameters). As on 31 July 2018, there are 1738 soil testing laboratories in India (including 71 in Karnataka). Government of India had released an amount of Rs. 517.42 crore since 2015 till 31 July 2018 to various states under Soil Health card scheme. Government of India provide Rs.190/ per sample for States for analysing soil on 12 parameters.
- iii. In all, 10.64 crore Soil Health Cards have been distributed during Cycle-I (2015-17) whereas 4.71 crore Soil Health Cards have been distributed to the farmers across the country during Cycle-II (2017-19). The details are given in the following graphs:

Picture -2: Status of soil Health Card scheme- collection and testing of samples



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

Picture -3: Status of soil Health Card scheme- printing and distribution of Reports

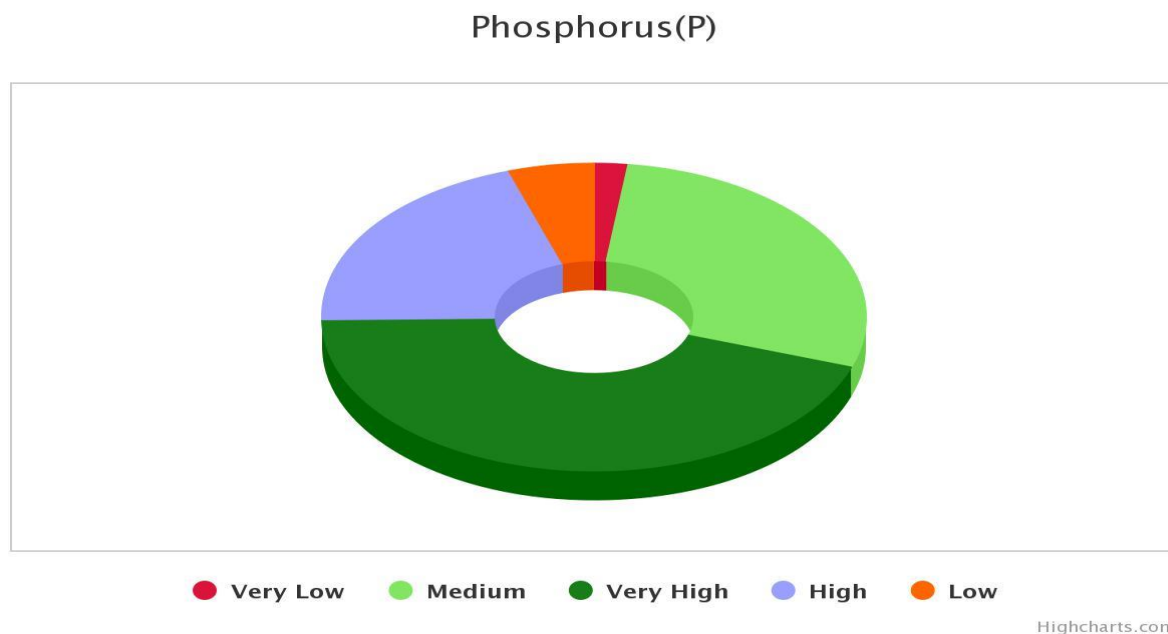


Source: <https://soilhealth.dac.gov.in>

II. Karnataka Implementation

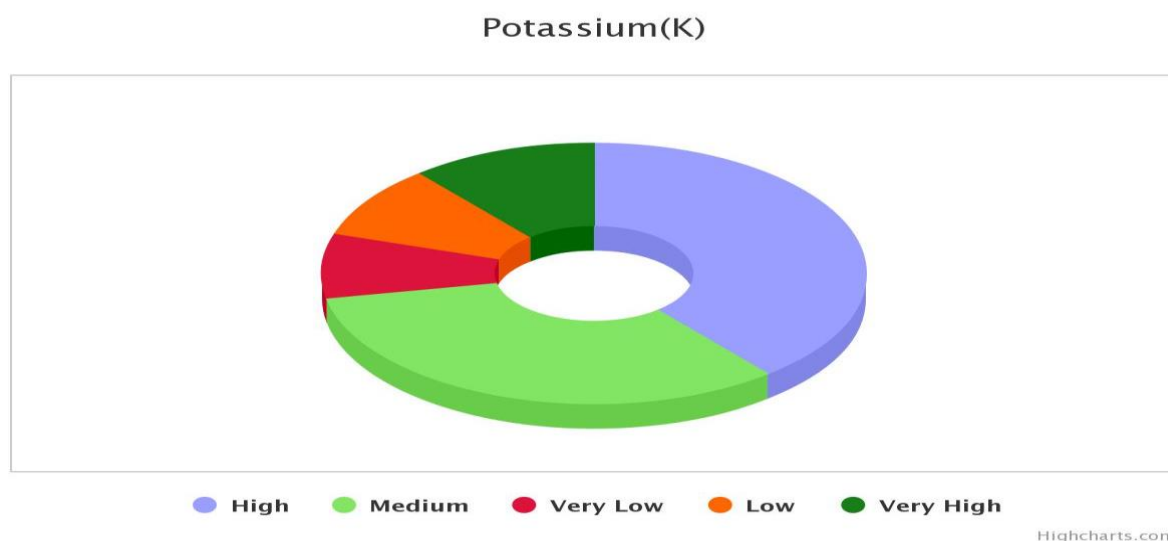
In Karnataka, as on 04 March 2019 (as per available latest data), details of SHCs of 1,56,52,659 samples were entered in NIC portal. General Status of nutrients in soils of Karnataka is given in the following graphs:

Picture -4: Status of Phosphorus in Soils of Karnataka



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

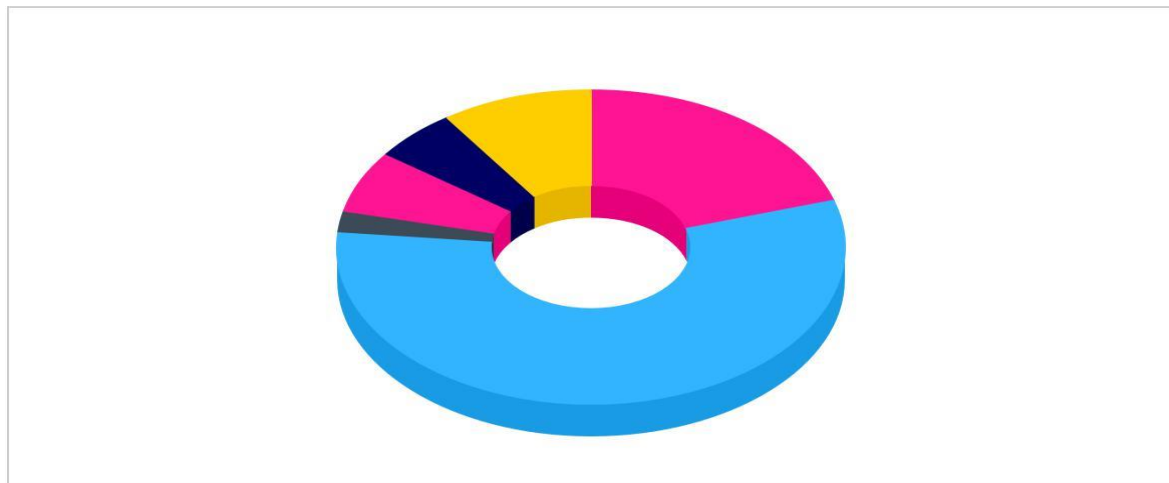
Picture -5: Status of Potassium in Soils of Karnataka



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

Picture -6: Status of pH in Soils of Karnataka

pH



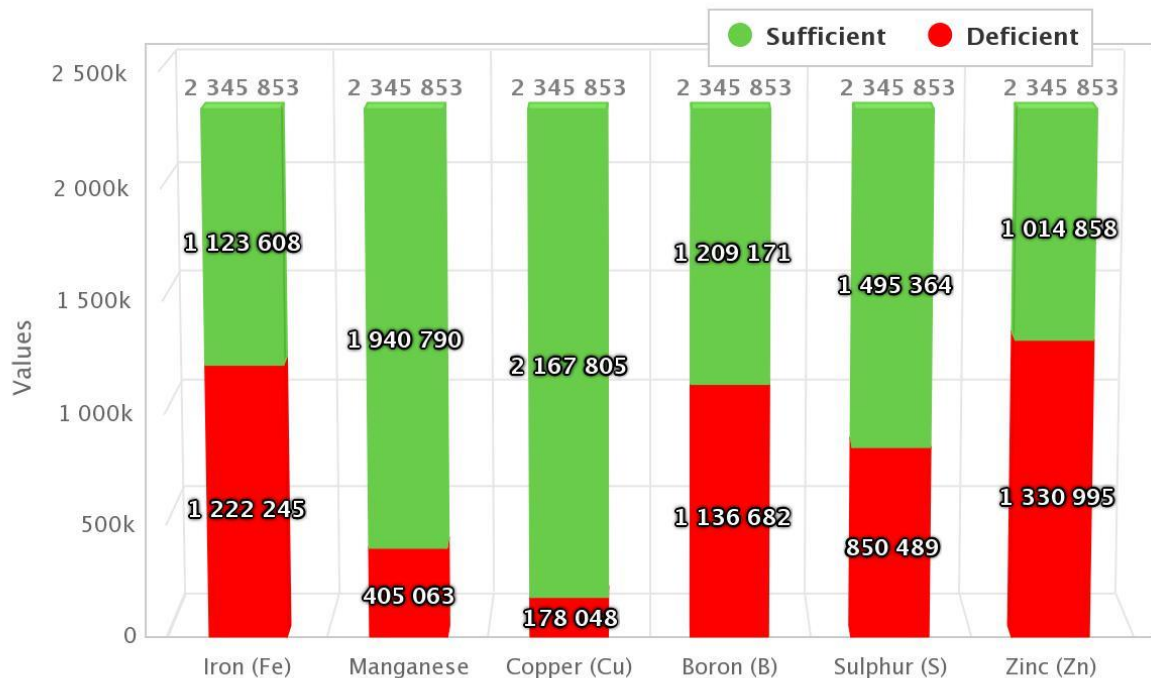
● Moderately acidic
 ● Moderately alkaline
 ● Neutral
 ● Strongly acidic
● Highly acidic
 ● Strongly Alkaline
 ● Acid Sulphate
 ● Slightly acidic

Highcharts.com

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

Picture -7: Status of micronutrients in Soils of Karnataka

Micro – Nutrient Status



Highcharts.com

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

II. District level (Agriculture Department) Implementation

1. The agricultural Department at the district level is having soil testing laboratory and is getting the soil samples from Assistant Director of Agriculture at Taluk level.
2. Soil samples are taken from the fields of farmers by the trained field staff (on contract basis) of Agriculture Dept. as per the grid.
3. The samples are collected from the field (unit area of 25 acre- in case of dry land areas and 2.5 acre- in case of irrigated area) using GPS on grid basis.
4. In each unit area, soil samples are collected from three different places.
5. The area is considered as irrigated if there is canal irrigation; other areas are considered as dry land areas.
6. In case of Dakshina Kannada Soil testing Laboratory, there was no pendency with regard to analyses of received samples as on date of visit.
7. Soil test reports are printed in colour. There is need for frequent replacement of cartridges. Hence, there was some pendency in printing of reports.
8. Soil test reports are distributed to the concerned farmers through Panchayats. There was some delay in distribution of reports.
9. There is not much trust among farmers about the soil test reports.
10. There was no awareness programme for farmers on soil sampling and use of soil test reports.

III. ICAR Institutions - CPCRI(Central plantation Crops Research Institute, Kasargod, Kerala) and IIHR(Indian Institute of Horticultural Research, Bengaluru)

1. As on date, there is no involvement of ICAR institutes in soil Health Card scheme.
2. These institutes have soil testing laboratory, primarily for attending to the research and other requirements.

3. These institutes do soil testing work for farmers if samples are given by farmer (IIHR charges Rs.1,000/- per soil sample, CPCRI charge 2500/- per sample)

IV. Krishi Vigyan Kendra (KVK)

1. KVK, Mangalore is having a mobile soil testing laboratory. However, there is not enough staff to conduct testing of soil samples. KVK, Udupi located at Brahmavar has a full-fledged soil testing laboratory, but, as on the date of visit, there was no soil scientist. KVK, Brahmavar charges Rs. 100/- per soil sample from farmer.
2. As on the date of visit, KVK was not part of Soil Health Card scheme.
3. However, the KVK issues report to farmers within a week after receipt of soil samples; sometimes messages are sent through post card/ WhatsApp/email, as per request of farmers.

V. Other institutions- PACS (Primary Agricultural Co-operative Society, FPO) (Farmers Producer Organisation), FC (Farmers Club), etc.

1. As on the date of visit, these institutions of farmers were not involved in the scheme.
2. However, these institutions are interested to join agricultural department in awareness creation among farmers.

VI. Farmers

1. Farmers are central to the success of the soil Health Card scheme.
2. As on date, soil sampling is done based on area definition (irrigated- 2.5 acre / dry land area- 25 acre) without considering the land terrain, number of farmers, type of crops, etc.
3. Soil sampling is done on grid basis using GPS with or without consulting farmers. Many times, one sample is taken from more than one farmer.
4. Soil test reports are generated as per the information available in land records (Bhoomi software in Karnataka), which is very often not updated.

5. Soil sampling is done randomly, without considering crop cycle (like after harvest and before new crop), season, etc.
6. Sometimes, farmers get report after a lapse of time (6 months to 2 years).
7. Many farmers are not aware of use of soil test report for changing fertilizers, change of quantity of fertilizers, etc.
8. The cost reduction due to use of SHC ranged from 20 (fertilizer decreased from 50kg per acre to 40 kg/ acre in case of paddy) to 50 % (decreased from 400 g/tree to 200 gram per tree in case of coconut) due to lower requirement of phosphorous in acidic soils. Some farmers changed from DAP (Di-Ammonium Phosphate) to urea (from 50 kg DAP to 100 kg area, saving was Rs.51 % per acre), due to higher availability of phosphorous in soil as per SHC.
9. Agricultural Department is also supplying dolomite (in case of plantation crops) and lime (in case of paddy @ Rs.72 per bag of 50 kg) .In case of secondary elements (Calcium, Magnesium, and Sulphur), the yield increase was substantial (20-60 %), while subsidised cost varied from Rs. 200-3000). The cost benefit ratio was as high as 1: 21(one quintal of dolomite increased paddy yield by 2 quintals per acre, Rs. 144 additional expenditure increased value of produce by Rs.3000/- per acre).
10. Due to application of zinc (the yield increase was 20 % in case of paddy) and Copper (in the form of copper sulphate), the yield increase was 20 % in case of areca-nut and 50 % in case of Coconut.

IV. Recommendations

Farmers

- viii. As on the date of visit, farmers were applying fertilizers, without actually knowing the availability of nutrients in soil. The problem has aggravated due to intensive cropping systems followed by farmers.
- ix. Government of India, has created database of soil fertility of different regions. This gives the macro-view of nutrients in the region and help State Governments to plan soil ameliorating measures in cases of problematic soils (like acidic and saline conditions).
- x. State Governments have established soil testing laboratories at district level (in addition to laboratories of KVK). As per farmers' portal (<https://farmer.gov.in/stl.aspx>), there are 3887 soil testing laboratories (including 514 district level labs) in India. Even though these district level laboratories do test the soil samples for 12 elements free of cost for the samples taken as per the grid advised by GoI, they also test soil samples of farmers for a minimum fee(Rs.100/- per sample) . Farmers can use the services of laboratory in due course of time. However, the trust of famers on these laboratory is less. The trust can be increased if there is independent verification of some results and these should be brought to the notice of local farmers.
- xi. There is a need for more involvement of farmers in the scheme. Awareness programmes for famers have to be undertaken compulsorily before collection of samples. Samples should be collected invariably with the involvement of concerned farmer and SHCs may be distributed within a specified period to the concerned farmer.
- xii. As on the date of visit, farmers depend on Agricultural Department for soil ameliorating measures suggested in soil health cards like application of lime, dolomite, etc.,(for acidic soils), etc. Over a period of time, the dependency can be reduced if FPOs, PACS, etc., are involved in providing these ameliorating inputs.

- xiii. In the era of increasing fertilizer prices, there is a need to use fertilizers judiciously. This may help the farmers to reduce the cost of cultivation to make agriculture remunerative even when the prices for the farm produce are low.
- xiv. Farmers generally do not apply micro- nutrients in normal course of time. Soil health card give information about micro- nutrients. The response for application of minor nutrients (zinc, boron, sulphur, etc.) is more than major nutrients (N, P, and K). Hence, soil health cards have become a good tool to increase the yield of crops.
- xv. Blind application of fertilizers sometimes leads to toxicity. Use of soil health cards helps to reduce the chances of toxicity and increases the chances of balanced nutrient availability in soils.

Agricultural Department- district Level

- vi. Soil Health Card (SHC) scheme of Government of India was able to establish soil testing laboratories at district level. This will help over a period of time.
- vii. As on date, the soil testing is done free if soil samples are collected by the panchayat level functionaries of the Department.
- viii. Soil samples are collected by the trained personnel of Department on village basis, without much involvement of farmers. As the SHC has to be used by farmers, their involvement need to be of paramount importance while collecting the soil samples.
- ix. The Department is spending a lot of money on printing of SHCs. Sending the report directly to farmers in soft form (WhatsApp, email, etc.) could be explored.
- x. As on the date of visit, the response time from soil sampling to receipt of report was high (sometimes as high as 2 years). There is a need to reduce the response time.
- xi. The Department can also use the services of other local institutions like PACS, FPOs, FC, SHGs, etc., to create awareness among farmers.

- xii. The Department should also create awareness among fertilizer dealers about the utility of SHCs and advise them to supply fertilizers and other inputs as per SHCs.

ICAR Institutes/ KVKs

- iii. SHC scheme has created a database of soil health status of the region; but farmers would like to have specific information about their field. These institutions can provide choices for the farmers with regard to soil testing.
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- v. SHC scheme is for the benefit of farmers and over a period of time this will help farmers to reduce the cost of inputs.
- vi. As on date, the Department is not involving these institutions due to accountability issues.
- vii. These institutions should take steps to educate farmers about soil sampling and use of SHC while applying fertilizers and other inputs.
- viii. PACs which are supplying fertilizers may think of providing discount (say 1 %) if any farmer brings and uses SHC while purchasing fertilizers.
- ix. PACS & FPO can think of supplying micro- nutrients if deficiencies are observed in large scale in the fields of farmers/ members.

State Government- Agricultural Department -

- iii. There is a need for more involvement of farmers in SHC scheme, as the farmer has to finally use the SHC to bring changes. As on date, involvement of farmers is minimum.
- iv. The involvement of fertilizer dealers in SHC scheme is minimum. There is a need to involve them in the scheme. Even Government can think of making it obligatory for them to supply fertilizers based on SHC information.

Central Government

- v. The grid of 25 acre in dry land and 2.5 acre in irrigated area too large for many farmers as more than 85 % of farmers are small and marginal farmers. There is a need a make scheme farmer- wise in case of small and marginal farmers.
- vi. The definition of irrigated area needs to change. As on date, area covered under dug well/ bore well is considered as dry land areas.
- vii. There is need to involve farmers from the beginning of the scheme. As on date, the trust level among farmers is low about the scheme.
- viii. There is a need to involve the fertilizer dealers legally in the scheme. Use of SHC while purchasing fertilizers may be made compulsory after a period of time.

V. Conclusion

The study shows that the database on soil health parameters has been created and for this latest technologies like GPS, online data capturing, online printing of SHCs, etc., were introduced and this has created macro – database of soil health information in different agricultural regions of India. However, in the entire exercise, not much efforts were taken to create awareness, educate farmers about the use of soil health card information to change application of inputs, reduction of cost, increase of yield, etc. There is a need to use the farmers' organisations like PACS, FPOs, etc., to educate their members.

There is a need to involve fertilizer dealers in the use of soil health information. If required, they may be compelled to sell fertilizers as per soil health card prescriptions. The Agricultural Department should take steps to increase trust level among farmers. The soil sampling has to be done before the sowing season and the SHCs to be given to farmers within reasonable time period.

Soil Health card will be useful only if farmer uses the information to bring changes in the cropping pattern, apply fertilizers as per actual requirements, take necessary amelioration measures to improve soil health, etc. The ultimate objective should be to make the farmer more competitive by reducing the input cost.
