Compendium on Soil Health

Ministry of Agriculture,
Department of Agriculture & Cooperation
(INM Division)
January 2012

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PREFACE

Soil test based nutrient management has emerged as a key issue in efforts to increase agricultural productivity and production since optimal use of nutrients, based on soil analysis can improve crop productivity and minimize wastage of these nutrients, thus minimizing impact on environmental leading to bias through optimal production. Deficiencies of primary, secondary and micronutrients have been observed in intensive cultivated areas.

With about 12 crore farm holdings in the country, soil analyzing capacity of 4 crore samples annually is required to enable analysis of each holding once in three years. This requires a massive expansion is soil testing programme in the States. Keeping this in view, a centrally sponsored scheme "National Project on Management of Soil Health and Fertility (NPMSHF)" was launched in 2008-09. In addition, States are availing substantial resources for soil testing programme under the "Rashtriya Krishi Vikas Yojana (RKVY)" and "Macro Management of Agriculture (MMA)".

There are clear indications that investment in expansion of soil testing facilities under various schemes has started to bear fruit. The number of soil testing laboratories increased to 1,049 in 2010-11 from 715 in 2009-10 while annual analyzing capacity went up to 1.07 crore samples from 0.78 crore samples. As a result, 0.74 crore soil health cards were issued to farmers during 2010-11 compared to about 0.57 crore during 2009-10.

Several States including Andhra Pradesh, Gujarat, Haryana, Karnataka and Uttar Pradesh have made commendable progress in soil testing programme in various ways such as expansion of soil testing facilities, popularization of the programme in campaign mode, development of soil fertility maps and use of information technology in delivering soil nutrient status and appropriate recommendation to farmers.

This compendium is an effort to put together existing status of soil testing facilities State-wise and highlight main issues in soil testing programme. Recruitment and training of manpower have emerged as major bottlenecks in further expansion requiring attention of State Governments.

I hope that compendium, by pooling together information made available by various States, will enable better appreciation of strategies and challenges for furthering sound nutrient management practices in interest of gains for farmers and strengthening of food security of the country.

I would also like to put on record my appreciation of the efforts made by the officers and staff of Integrated Nutrient Management Division in bringing out this compilation.

(P.K. Basu)

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Contents

Introduction

Soils

Soil is a thin layer of earth's crust and is a living media, which is one of the important factors of crop production and serves as a natural nutrient source for the growth of plants. The components of the soils are mineral material, organic matter, water and air, the proportions of which vary and which together form a system for plant growth.

The soils are studied and classified according to their use, which is termed as "land capability classification". In this classification, inherent soil characteristics, external land features and environmental factors are given prominence. For this purpose soil survey is carried out to record the crop limiting factors such as soil depth, topography, texture and structure, water holding capacity, drainage features followed by evaluation of soil fertility based on soil testing / soil analysis. According to their use the soils are classified into 8 classes, four of which are considered suitable for agriculture purpose and remaining are non-arable lands and can be used for silviculture and forest and need strong conservation measures. An effective linkage between soil testing and soil survey is useful to ensure formulation of a sound soil fertility evaluation programme. In the administrative set up, soil survey is generally kept under the discipline of natural resource management while soil testing remains a part of the discipline of fertilizer use and management.

Proper maintenance of the soil health, which is necessary from agricultural point of view, refers to the capacity of the soil to ensure proper physical, chemical and biological activities/processes for sustaining higher crop productivity. A productive soil would ensure proper retention and release of water and nutrients, promote and sustain root growth, maintain soil biotic habitat, respond to management and resist degradation (see **Annex 1**).

Nutrient Status of Soils

Intensive agriculture, while increasing food production, has caused second generation problems in respect of nutrient imbalance including greater mining of soil nutrients to the extent of 10 million tons every year depleting soil fertility, emerging deficiencies of secondary and micronutrients, decline of water table and its quality of water, decreasing organic carbon content, and overall deterioration in soil health.

Indian soils not only show deficiency of primary nutrients (Nitrogen, Phosphorous and Potassium) but also of secondary nutrients (Sulphur, Calcium and Magnesium) and micro nutrients (Boron, Zinc, Copper and Iron etc.) in most parts of the country. Besides the three primary nutrients (N, P, K), deficiency of Sulphur and micro nutrients like Zinc and Boron in many of States, and of Iron, Manganese and Molybdenum in some States, has become a limiting factor in increasing food productivity. In a comprehensive study carried out by ICAR through their Coordinated Research Project on Micronutrients, Toxic and Heavy Metals, based on analysis of 2,51,547 soil samples from different States, it was found that 48% of these

samples were deficient in Zinc, 33% in boron, 13% in Molybdenum, 12% in Iron, 5% in Manganese and 3% in Copper. Deficiency of micronutrients needs to be corrected through the application of micronutrient carrying fertilizers. With regard to response of crops to the application of micronutrients, under large scale agronomic trials conducted by ICAR, it has been observed that the additional yield is obtained in cereals in the range of 0.3 to 0.6 ton per hectare. The response of micronutrients in food crops and vegetables is highly pronounced. Under micronutrient deficient situations, the application of major nutrients alone does not give expected results. The status of soil nutrient (NPK) status in selected districts of some States determined by the Indian Institute of Soil Science, Bhopal is given at **Annex 2.**

Generally, NPK consumption ratio of 4:2:1 is considered as desirable based on recommendation of 120:60:30 NPK kg/ha dose (4:2:1) for wheat/rice. However, the fertilizer dose has to be worked out based on soil analysis to find out (i) available nutrient status of the soils and (ii) the crop requirement of the nutrients; the difference of the two (ii – i) is the required fertilizer dose for a given crop. Other factors affecting fertilizer use efficiency have to be built into the computation of fertilizer dose. There is a wide NPK use ratio in Northern Zone (13.5: 4.3:1), while it is narrower in Southern Zone (2.9: 1.6: 1). It is 5.6: 3.3: 1 in Western Zone and 5.0: 2.4: 1 in the Eastern Zone. The NPK ratio also shows wide variations from State to State. The existing NPK consumption ratio in different States in the country is given in **Annex 3**.

Though, chemical fertilizers are a major source of nutrients to crops, use of chemical fertilizers alone for a long period of time leaves unfavorable effects on soil physical, chemical and biological property and environment. The better approach is to integrate chemical fertilizers with organic manures to avoid ill effects on soil and environment (see **Annex 4** for strategies to promote soil health). The integration of nutrients results in improved efficiency of chemical fertilizers and better cost benefit relationship. Organic manures though low nutrient carrying material, leave a favorable effect on soil properties (see **Annex 5** for strategies to promote organic manures). Studies carried out with cereal-based cropping systems under Cropping Systems Research project of ICAR has established that 25-50% fertiliser NPK dose to *Kharif* crops can be curtailed with the use of FYM, *Sesbania* green manure and crop residues under different situations. Experiments conducted on cultivators' fields during 1990-91 to 1994-95 under Cropping Systems Research Network (ICAR) further reveal beneficial effect of integration of chemical fertilisers with green-manuring or FYM, as the total productivity of the systems involving cereals, oil seeds and cotton increased by 7 to 45% over farmers' practice in different agro-ecological zones. In sugarcane-based cropping system, integrated use of sulphitation, press mud, cane trash and biofertilisers each with inorganic fertilisers and green-leaf manuring brought 20-50% economy in fertiliser N applied to sugarcane by improving the use efficiency of N, P and other nutrients. Similar results have been obtained in the trials conducted by the Indian Institute of Soil Science, Bhopal and many SAUs.

Fertilizer consumption

Fertilizer use was started in the country with the start of planning process in early fifties. However, only negligible quantities were consumed during initial years. A remarkable success was achieved during Green Revolution era when, with the availability of high yielding variety of seeds (specially wheat), irrigation, fertilizer and credit to the farmers, brought about increased food production. The country has made impressive strides in agriculture and has achieved food security, mainly due to Green Revolution powered by improved varieties of seeds, application of fertilizers and assured irrigation. By 2010-11, production of foodgrain had increased 4.8 times in 2010-11, oilseeds has increased 6 times, cotton 11 times and sugarcane 6 times, compared to 1950-51.

While impressive strides in agricultural production have been made, consumption of fertilizer (nitrogen + phosphorus + potash) has increased from 0.07 to 28.10 million tons (in nutrient terms) over the same period. India is the second largest producer and consumer of nitrogenous fertilizers and the second largest consumer of phosphatic fertilizers in the world. China and USA are the other two countries competing with India in terms of production and consumption of nitrogenous and phosphatic fertilizers. India is totally dependent on imports for potassic fertilizers and also imports large amounts of phosphatic fertilizers and the raw materials required for their production. In terms of over all consumption, India has attained a level of 57.5 million tons of fertilizers of various types which is represented by a consumption of 28.1 million tons of nutrients comprising 16.6 million tons of nitrogen, 8.0 million tons of phosphorus and 3.5 million tons of potash. Expressed as consumption per hectare, it is 144.14 kg NPK (2010-11) which is, however, far less than China (289 kg), Bangladesh (197 kg) and many European countries. It is assessed that in the country 10 million tons of plant nutrients are removed by various crops in excess to what is being applied in the form of fertilizers.

A great variability has been observed in fertilizer consumption among States **(Annex 6).** Whereas, per hectare consumption is 237 kg in Punjab, 225 kg in Andhra Pradesh, 210 kg in Haryana and 206 kg in Tamil Nadu, the consumption is comparatively low in Rajasthan (48 kg/ha.), Himachal Pradesh (58 kg/ ha.), Orissa (57 kg/ha.) and Jharkhand (70 kg/ha.). The consumption is below 5 kg per hectare in some of the North-Eastern States.

The Task Force on Balanced Use of Fertilizers (2005) constituted by Department of Agriculture & Cooperation had estimated that in order to meet the requirement of 300 million tons of foodgrain by 2025, 36 million tons of fertilizers in nutrient terms would be needed to increase foodgrain yield to achieve required production, since there is limited possibility of further increase in total area under cultivation of 142 million hectares. National Academy of Agricultural Sciences has estimated (2009) that for meeting food needs of the country by 2025, India may have to increase its plant nutrient supply to over 45 million tons. Out of this, 35 million tons should come from chemical fertilizer sources and rest 10 million tons from organic sources.

Soil Testing Programme

Fertilizer consumption has to be crop responsive and efficient to increase production while rationalizing input cost and minimizing environmental degradation. A fertilizer not suitable to a soil type can be called as an incorrect fertilizer used for that soil and it will contribute in consumption amounts. Different types of fertilizers are required to be used in acid and alkali soils. Where citrate soluble and water insoluble phosphatic fertilizers can be efficiently used in acid soils, they will not respond in alkali soils. Fertigation involving the use of water soluble fertilizers through sprinklers and drips is expected to give better use efficiency for both, the water and fertilizers. Site specific nutrient management involving soil test based application of fertilizers is critical to efficient utilization. Use of required sources of plant nutrients has to be promoted, coupled with the use of soil amendments in acidic/ alkaline soils for moderating acidity/alkalinity by bringing the soil pH to near neutrality so as to enhance soil nutrient availability and efficiency.

The soil testing programme was started in India during the year 1955-56 with the setting-up of 16 soil testing laboratories under the Indo-US Operational Agreement for "Determination of Soil Fertility and Fertilizer Use". In 1965, five of the existing laboratories were strengthened and nine new laboratories were established with a view to serve the Intensive Agricultural District Programme (IADP) in selected districts. To meet the increasing requirement of soil testing facilities, 25 new soil-testing laboratories were added in 1970. In addition to this, 34 mobile soil testing vans were established under the joint auspices of the Technical Cooperation Mission (TCM) of USA, IARI and Govt. of India to serve the farmers in remote areas and also provide education to them on the benefits of balanced fertilization through group discussions, demonstrations, film shows etc.

The capacity of the soil testing laboratories in the intensive agricultural districts was initially created to analyse 30,000 soil samples annually by each laboratory. The installed capacity of the laboratories varied from 1000 samples/yr/lab (some cases in UP) to 30,000 to 70,000 samples/year, in Tamil Nadu. Out of 354 testing laboratories functioning with an analysing capacity at approx. 4 million soil samples per year, during 1981, 90 laboratories each had less than 5000 sample analysing capacity per annum, 142 labs had 6-10,000 samples capacity and 65 labs had a capacity to analyze between 11-20,000 samples/year. A total of 47 labs had a capacity of 21-30,000 samples per year and 10 labs had more than 30,000 samples/year capacity. Presently, the thinking is to set-up smaller laboratories with the analysing capacity of 10-12,000 samples/year. Till about 1980, the laboratories generally used to analyse soil samples for pH, texture, electrical conductivity, and available N P K. There used to be no analysis for micronutrients. The process of setting up of soil testing laboratories has continued, year after year, with the financial support from Government of India, State Governments and Fertilizer companies who are also setting-up the soil testing laboratories.

Government of India is promoting integrated nutrient management (INM) balanced and judicious use of chemical fertilizers, bio-fertilizers and locally available organic manures like farmyard manure, compost, vermi compost and green manure based on soil testing to maintain soil health and productivity. Total nutrient content varies from soil to soil depending upon the nature of parent material and other soil forming processes. Only the plant available form of the

nutrient in the soil is relevant for the crops and is chemically determined through appropriate testing methods which are deployed in soil testing laboratories. During 11th Five Year Plan, a National Project on Management of Soil Health and Fertility (NPMSHF) was approved during 2008-09 with an outlay of Rs. 429.85 crore. The scheme provides for setting up of new soil testing laboratories and strengthening of the existing labs with micronutrient testing facilities. Apart from this project, assistance for soil testing laboratories is also being provided to States/UTs under the Rashtriya Krishi Vikas Yojana (RKVY). There were 1,049 soil testing labs in the country with an annual sample analyzing capacity of 107 lakh as on 31.03.2011 **(Annex 7).** Based on the soil analysis, State Governments have issued 408 lakh soil health cards to the farmers **(Annex 8).**

The State Governments are preparing district wise and also block wise fertility maps. Some States have prepared even village level fertility maps. Some States have started computerization of soil test data with regard to fertility status where the farmers can access them online and advisory can be delivered to them through mobile phones.

Policy letters to State Governments

In view of the critical role being played by soil testing in ensuring balanced and efficient use of fertilizer, the Union Minister for Agriculture wrote to the Chief Ministers of the States on 4th March, 2010 advising them to enhance and improve the soil testing programme in their respective States (**Annex 9).** This was followed up with a letter to the Agriculture Secretaries of the States on 16th June, 2010 from Joint Secretary (INM) inviting their attention to the letter of the Honb'le Agriculture Minister and requesting them to send a detailed Action Plan to the Ministry including existing status of soil testing facilities, soil health cards issued to the farmers and also to inform about any highlights in the implementation of the programme (**Annex 10).** The matter was further pursued with the states through a D.O. letter written by the Special Secretary (Agriculture) to the Chief Secretaries of the States on 21st March, 2011, emphasizing the need for enhancing the soil testing facilities for major and micro nutrient testing and to provide soil health cards to all farmers (**Annex 11).** The Secretary (Agriculture & Cooperation) wrote on 11.06.2011 to the Chief Secretaries of the States which account for 100 districts consuming 50% of the total fertilizer used in the country, highlighting the need to issue soil health cards to the farmers in these districts on priority and for making efforts to issue soil health cards to all farmers by July, 2013 (**Annex 12).** The Secretary (Agriculture & Cooperation) wrote another letter to the Chief Secretaries of all the States on 19th July, 2011 (**Annex 13)** for availing financial support available under centrally sponsored schemes for strengthening the capacity and quality of soil testing programme in the States and also advised the States to make use of the Soil Testing Manual (available on Department's website i.e. www.agricoop.nic.in). These communications indicate the importance being given by the Ministry of Agriculture to promotion of soil test based balanced use of fertilizers for increasing crop production in the country.

Highlights of State-wise Soil Test Based Fertilizer Use Programme

Based on information received from State Governments, the status of soil testing programme and action plan for expanding it and provding soil health cards to farmers has been compiled and presented in this chapter, State-wise.

Major features of soil testing status including successes and challenges are highlighted below:

Successes/Best Practices

- All the States have adopted the system of preparing and issuing soil analysis based soil health cards to the farmers along with fertilizer use recommendations.

- Most States have taken up the task of preparing soil fertility maps starting from preparing the State level maps down to District, block and even village level in some cases.

- Almost all States have indicated plans for substantial expansion in soil testing programme during 11^{th} and 12^{th} Plans with funding from the National Project on Management of Soil Health & Fertility (NPMSH&F), Rashtriya Krishi Vikas Yojana (RKVY), Macro Management of Agriculture and State Plan.

- Campaign mode of implementation of soil testing programme has been successful in rapid expansion of soil testing programme. Bhoochetna programme, implemented in Karnataka and being replicated in Andhra Pradesh, is a good example of collaborative effort (in association with ICRISAT and State Agricultural Universities) with focus on increasing yield. 'Krishi Mahotsav' in Gujarat and 'Apni mitti pehechane abhiyan' in Uttar Pradesh have been instrumental in rapidly increasing soil testing facilities and issue of soil health cards. Private agencies have been enlisted in Rajasthan for creating soil testing facilities while agencies concerned with agriculture like Land Development Corporation, Sugar Cooperatives and Agriculture Produce Marketing Committees are being involved in Gujarat in analysis and issue of soil health cards to the farmers.

- Some States (Andhra Pradesh, Gujarat and Haryana) have implemented computerization of soil test reports and communication of these reports with appropriate fertilizer use recommendation online or through mobile phones to the farmers. This will greatly help in reducing the time lag between soil analysis and communication of results. Several States (such as Karnataka) are in the process of doing so.

- States such as Orissa and Tripura have made specific interventions for soil amendment. Orissa has acidic soils and has effectively used paper mill sludge for increasing crop yield.

- Keeping in view the existing gap between the available and required soil testing facility, some States have fixed village wise number of samples to be collected, the analysis of which can be taken to represent village wise soil fertility status in the interim. To the extent possible, individual farm samples are also analyzed. Andhra Pradesh has fixed a target of 15 samples/village while the State of Haryana has fixed a target of 100 samples/village.

- To improve the quality of analysis and monitoring the working of soil testing laboratories, most of the States have identified their central and well equipped soil testing laboratory as a Nodal lab.

- Barring few, most of the States are involving their State Agricultural Universities to help in preparation of soil fertility maps and also helping the States in training programmes.

Constraints and challenges

- A large number of States have indicated the shortage of required technical personnel to man soil testing laboratories. Lack of available manpower is the most important limitation in running the programme on sound scientific ground. It remains a major challemnge for most States, including States such as Karnataka and Punjab. A drive for recruitment of qualified personnel must, therefore, become a priority for successful management of soil testing programme in most States.

- Training of existing manpower is another area requiring attention. Some States have indicated contractual hiring of manpower or operationalizng soil testing facilities in PPP mode as stargies to overcome inadequacy of manpower. Even in such cases, training needs remain an area of concern.

- Space is a constraint in some States requiring construction of laboratory buildings.

State-wise status of the soil health programmes as on 01.04.2011 at a Glance

Andhra Pradesh

Existing Status

Number of Soil Testing Laboratories set up in the State	118 STLs including fertilizer industries. 84 STLs and 5 MSTLs under State Government. 25 STLs and 4 MSTLs under Fertilizer Industries.
Annual analyzing capacity	5,43,000 samples.
Capacity Utilization.	85.18 %
Review of functioning	Functioning of STLs is reviewed bi-monthly.
Constraints	The constraints are mainly of equipment and manpower.
Monitoring	STLs are monitored by a Nodal Laboratory.
Number of Soil Health Cards issued	5.11 lakh soil health cards are issued during 2010-11 (cumulative total 37.91 lakh soil health cards upto March, 2011).
Preparation of soil fertility map.	Preparation of soil maps at Mandal level is in progress.
Involvement of State Agricultural University	SAUs demonstrate soil test based fertilizer use during Rythu Chatanya Yatra and Melas.

Action Plan

Issue soil health cards	State Government is issuing soil health cards to farmers since inception i.e. 1957, when first STL was set up.
Additional labs, Static and mobile are planned to be set up	3 new STLs and 2 new mobile STLs are planned to be set up.
Strengthening existing soil testing laboratories for micronutrient testing	Planned to strengthen the laboratories for micronutrient testing under National Programme.
Staffing of laboratories.	• Staff for new STL is 1- Agri Officer, 1 - Agri Extn. Officer & 1- Attendant. Further 2 - Soil Analyst, 2 - Lab Assistants, 1 - Computer Operator, 2- Daily Wage Worker, 1 - Attendant is hired on contract basis. • Staff for Mobile STL is "1- Agri Officer, 1 - Agri Extn. Officer, 1- Soil Analyst, 1 - Attendant, 1- Driver and 1- daily wage Worker. • The regular staff and those hired on contract basis will be given training on analysis of soil samples at State Agricultural

	Management Extension and Training Institute (SAMETI) and Regional Soil Testing Labs.
Preparation of Soil Fertility Maps	It is proposed to prepare Mandal level Soil Fertility Maps.
Popularizing soil test based application of fertilizers including demonstration and publicity	• Every year, Rythu Chaitanya Yatra are organized where vide publicity is given to create awareness about importance of soil testing and soil test based fertilizer application. • Field demonstrations and front line field demonstrations are being organized in all the districts from the funds available under CSS of DAC.

Successes/Best Practices

1. Agriculture Resources Information Systems Network (AGRISNET):
AGRISNET was launched in the State of Andhra Pradesh on February 11, 2009 for the benefit of the farming community. The url is http://www.apagrisnet.gov.in . Under hardware component, 254 Desktop computers along with dot matrix printers were supplied to 254 Mandal Agricultural Officers under AGRESNET. Till date, following services are developed under AGRISNET. Content generation and development of complete AGRISNET portal has been taken up in the State including **soil fertility maps,** package of practices of 18 important crops grown in AP, iInformation on inter-crops, Integrated Pest Management (IPM), System of Rice Intensification (SRI), weather based information, Organic Farming, information about Minimum Support Price (MSP) of crop produce, Maximum Retail Price (MRP) of Fertilizers etc., precaution to be taken during purchase of inputs, schemes and subsidies of department, crop wise frequently asked questions (FAQs) – 508 FAQs are included in the portal, answers to queries posed by farmers, key contacts in Agriculture Department, programme schedules of Radio and TV along with misbranded pesticide information and any current issues, video clips of farmers success stories.

2. Online Soil Health Card generation system:
An application is developed to computerize soil test results. Through this application, the officers of the soil testing laboratories enter the soil test results into the system. Farmer's details, soil sample details, result of soil analysis such as soil type, Ph, EC, organic carbon, available NPK, crop wise recommendations of nutrient use and also soil amendments in case of problem soils are the parameters used. Farmers can download the soil health card online using the '**unique number'** allotted to each sample (Out of 3 sample slips made while collecting a soil sample, one slip is given to

the farmer which has "unique number" ascribed to the sample). Facility is also provided to send the soil test based fertilizer recommendation through SMS to farmers' on mobile phones. More than 10 lakh samples have been fed into the system to generate and send the soil health cards to farmers. Farmer can visit a common service centre (CAC) near his village, present the slip with unique 15 character code. The first 6 characters are numbers corresponding to the year. The next 3 characters represent the district code. GNT – represents Guntur District sample. The next 2 characters, after district code, represent the mandal codes. The last four characters are numbers starting from 0001 to 9999. CAC operator visits the online soil health card section in www.apagrisnet.gov.in and with the help of '**unique code'** downloads the card and gives a print out.

3. Wall painting of fertilizer maps:

During 2008-09 Department of Agriculture had painted on walls the soil fertilizer index maps with fertilizer recommendation for major crops in each village so that farmers can apply fertilizers according to this map. This practice is continuing.

4. Farming situation:

The State Govt. has divided the whole State into 240 farming situations taking into account soil type, topography, rainfall, major crops in an area and other agro ecological parameters. Farming situations obviously vary from district to district. There are 17 farming situations in Kurnool; 15 each in Karimnagar, Nellore and West Godavari; 6 in Vijayanagaram; and 7 each in Chittoor and Nizamabad. 15 soil samples will be collected from each farming situation for soil analysis to judge the soil fertility status which will be monitored for 3 years. A total of 3,600 samples will be collected each year from the 240 farming situations. Change in soil fertility will be monitored and fertilizer use and other programmes shall be organized keeping in view a particular farming situation. This programme is expected to help in management of crop production programme which is being organized with a greater scientific support and after giving a specific weightage to a given farming situation.

5. "**Bhoochetana" compaign:**

The programme has been taken up by ICRISAT and State Agriculture University in the similar manner as has been done in Karnataka. The programme aims to identify and scale up best options (soil, crop and water management), including improved cultivars. Under the programme, training of Agriculture Officers will be arranged on soil sampling, analysis of micronutrients and in preparation of GIS based soil maps. The programme also stipulates improving skills of farmers in sustainable use of natural resources for enhancing crop productivity.

6. Change in Fertility Status:

An analysis of soil test data over a period of 8 years (during 2002-03 to 2009-10) shows that there is a build up of soil phosphorus over this period where 46% of samples were found to be low in phosphorus content during 2002-03 were reduced to low

phosphorus status in 22% cases. During corresponding period, the medium and high status which was in 33 and 21% cases during 2002-03 was found to have increased in 41 and 35% cases respectively. The nitrogen and potassium status remained unchanged.

Arunachal Pradesh

Existing Status

Number of Soil Testing Laboratories	6 STLs (3 static and 3 mobile vans).
Annual analyzing capacity	Annual analyzing capacity of 3 static labs is 15,000 samples and that of 3 mobile labs 12,000 samples.
Capacity Utilization	The capacity utilization is 40%
Review of functioning	Being done
Constraints	• Many of the equipment in the laboratories are old and non-functional and need immediate replacement. • Trained manpower is insufficient. • There is need for trainings to be organized in soil testing at reputed national level training institutes.
Monitoring	Not being done
Number of Soil Health Cards issued	32,000 soil health cards have been issued so far.
Preparation of soil fertility map.	A soil map for Arunachal Pradesh has already been prepared.
Involvement of State Agricultural University (s).	The college of Horticulture and Forestry is involved in helping the State in devising soil test based fertilizer use recommendations.

Action Plan

Issue soil health cards	Issue of soil health cards is a continuing activity.
Additional labs, Static and mobile are planned to be set up	It has been proposed to set up 7 mobile vans during 2011-12.
Strengthening existing soil testing laboratories for micronutrient testing	A proposal is being submitted for strengthening the labs for micronutrient testing by providing AAS.
Staffing of laboratories	The required staff is proposed to be provided from the existing strength of the department.
Preparation of Soil Fertility Maps.	It is proposed to prepare the fertility map by the year 2014.
Popularizing soil test based application of fertilizers including demonstration and publicity.	Awareness creation activities are being taken under ATMA Programme.

Bihar

Existing Status

Number of Soil Testing Laboratories	There are 22 district level STLs.
Annual analyzing capacity	2,20,000 samples
Capacity Utilization.	65.32%.
Review of functioning.	Yet to be developed.
Constraints	The State Govt. is planning to strengthen the program in a systematic manner.
Monitoring	STLs are monitored by Central Laboratory at Patna by re-analyzing 3% samples analyzed of other laboratories.
Number of Soil Health Cards issued.	6.13 lakh
Preparation of soil fertility map.	• District wise soil fertility maps are being prepared. • GPS based soil fertility status data bank will be prepared.

Action Plan

Issue of soil health cards	• The State Govt. plans to issue 113.82 lakh soil health cards during 2010-11 to 2014-15. • Web based soil health cards are proposed to be issued.
Additional labs, Static and mobile are planned to be set up	• Decided to set up block wise soil testing laboratories. Upto 2009-10, sanction was given to construct buildings in 170 blocks. • Approval has also been given to purchase equipment and glassware for 110 laboratories. • An amount of Rs. 250 crore is proposed to be spent during 2010-11 to 2014-15 under NPMSF, RKVY and State Plan Schemes.
Strengthening existing soil testing laboratories for micronutrient testing	During 2006-07, under State plan scheme, 16 new district laboratories were approved for establishment in addition to strengthening the old laboratories.
Staffing of laboratories	For 38 district soil testing laboratories arrangements have been made to appoint the required staff as per guidelines of Ministry of Agriculture.
Preparation of Soil Fertility Maps	District wise soil fertility maps are being prepared.
Popularizing soil test based	To propagate soil test based fertilizer use elaborate

application of fertilizers including demonstration and publicity.	arrangements have been made according to which campaign is launched at the district, division and at the State level highlighting the benefits of soil test based fertilizer use.

Successes/Best Practices

Under Public Private Partnership (PPP) mode, following package has been offered to NGOs , unemployed agriculture graduates, retired scientists of Rajendra Agriculture University, Agriculture Clinic and Agri Business Centres:

- To carry out the business of seed, fertilizer and pesticides.
- Make available small agricultural equipment on custom hiring basis.
- During 1st year, to make available equipment, chemicals and glassware for analysis of N, P, K, Ph & EC.
- To create soil analysis capacity of 2,500 samples at a block level and charge Rs. 20 per sample from the farmers.
- Govt. will provide Rs. 30 per sample analysis in addition to farmer's payment of Rs. 20 per sample.
- The Govt. will organize training of workers twice annually.

Chhattisgarh

Existing Status

Number of Soil Testing Laboratories	The State has set up 5 static and 4 mobile soil testing laboratories (STLs).
Annual analyzing capacity	• The total sample analyzing capacity is 70,000 for macro and 15,000 for micronutrients. • Each static STL has 10,000 and mobile STL has 5,000 sample analyzing capacity for major nutrients annually. Each static laboratory also has a capacity to analyze 3,000 samples for micronutrients.
Capacity Utilization	Utilization of capacity was about 125% in case of static STLs and 40% in case of MSTLs during 2010-11.
Review of functioning	Functioning of the laboratories is reviewed monthly and also quarterly.
Constraints	There is constraint of non availability of some essential equipment and qualified staff and need for their training.
Monitoring	• At present, there is no Nodal/ referral laboratory in the State. • It is proposed to make the existing STL at Raipur as a Nodal laboratory. For this purpose, a proposal is under consideration comprising procurement of equipment & accessories, chemicals & glassware, expansion of the existing building and a sample collection van.
Number of Soil Health Cards issued	2.8 Lakh soil health cards have been issued from March, 2002 to March, 2010 and 95,416 SHCs were issued during 2010-11.
Preparation of soil fertility map	District wise soil maps are prepared on the basis of samples analyzed during last 10 years. Soil fertility maps have been prepared by soil testing laboratories on the basis of soil samples analyzed from particular block and Districts. Village level soil mapping (GPS based) of 2 Districts i.e. Janjgir and Dhamtari is in the process under RKVY scheme (2008-09), through Indira Gandhi Agricultural University (IGKVV), Raipur.
Involvement of State Agricultural University(s)	The State Agricultural University is involved in formulating the equation for site specific crop wise soil test based fertilizer recommendation for Chhattisgarh

	plane, Bastar plateau and northern hilly zones of the State. These equations are regularly revalidated and tested on farmers' fields through limited demonstrations depending upon the resources available.

Action Plan

<table>
<tr><td>Issue soil health cards</td><td>There are 32.55 lakh farmers in the State. About 11.5% of them were provided with soil health cards up to March, 2011. It is difficult to cover rest 88.5% farmers within a limited time, so a plan has been prepared to cover all villages of the State to assess the fertility level of soils. As per the available analyzing capacity (70,000 soil samples), programme has been prepared for collection of 3,05,288 soil samples covering all villages of the State by the year 2013-14.</td></tr>
<tr><td>Additional labs, Static and mobile are planned to be set up</td><td>Under RKVY scheme, 3 static STLs and under NPMSHF, 2 static and 2 mobile labs (one in private sector and another by IGKVV) have been sanctioned by Govt. of India, which may start functioning in the year 2012-13. There is also a proposal for setting up of 4 MSTLs in PPP mode .</td></tr>
<tr><td>Strengthening existing soil testing laboratories for micronutrient testing</td><td>At present, all the 5 static laboratories have facility for analyzing micro nutrients (Zn, Fe, Cu and Mn). Simultaneously some strengthening work is under progress through RKVY funds.</td></tr>
<tr><td>Staffing of laboratories</td><td>The regular staffing pattern for STLs is as under:
Static Laboratory:
<table>
<tr><th>Post</th><th>Class</th><th>No.</th></tr>
<tr><td>Asst. Soil Testing Officer</td><td>II</td><td>1</td></tr>
<tr><td>Sr. Agriculture Officer</td><td>III</td><td>1</td></tr>
<tr><td>Agriculture Officer</td><td>III</td><td>2</td></tr>
<tr><td>Lab Assistant</td><td>III</td><td>2</td></tr>
<tr><td>Accountant/ Assistant Gr. II</td><td>III</td><td>1</td></tr>
<tr><td>Assistant Gr. III</td><td>III</td><td>1</td></tr>
<tr><td>Peon</td><td>IV</td><td>1</td></tr>
<tr><td>Peon (Contingency)</td><td>IV</td><td>1</td></tr>
<tr><td>Total</td><td></td><td>10</td></tr>
</table>
Mobile STL :
<table>
<tr><th>Post</th><th>Class</th><th>No.</th></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td>
<table>
<tr><td>Sr. Agriculture Officer</td><td>III</td><td>1</td></tr>
<tr><td>Lab. Assistant</td><td>III</td><td>2</td></tr>
<tr><td>Assistant Gr. III</td><td>III</td><td>1</td></tr>
<tr><td>Driver</td><td>III</td><td>1</td></tr>
<tr><td>Peon (Part time)</td><td>IV</td><td>1</td></tr>
<tr><td>Total</td><td></td><td>6</td></tr>
</table>
Posting of the qualified staff has been started and proper training is planned to be given to them by the scientists of SAU.
</td></tr>
<tr><td>Preparation of Soil Fertility Maps</td><td>Block and District level soil fertility maps are prepared based on the samples analyzed for last 10 years. Village level soil mapping of 2 districts is in progress under RKVY scheme. It is planed to prepare village wise soil maps by analyzing at least 2 samples of each type of soil from each village. Thus all the 19,777 villages of the State will be covered by the year 2013-14.</td></tr>
<tr><td>Popularizing soil test based application of fertilizers including demonstration and publicity.</td><td>

Out of sanctioned component under this project, 7 field demonstrations, 7 front line demonstrations in 14 adopted villages by STLs, 2 training of field functionaries and 12 training of farmers have been organized during the year 2010-11.
Crop demonstrations under NFSM & ATMA schemes are organized on soil test basis. Farmers field school, farm school and training programme under different schemes of Govt. of India i.e. ATMA, NFSM, ISOPAM, ICDP Rice/Wheat etc. are also organized.
Recommendation of fertilizer through soil health card is compulsory which is popularizing soil test based fertilizer application among farmers.

</td></tr>
</table>

Successes/Best Practices

- 8,031 soil samples were collected in 2010-11 from farmers at Mandi places (APMC) and soil health cards issued to them free of cost by Mandi Board.
- Kisan Rath Yatra approaches selected village of each block and Kisan Mela is organized at district level where demonstration on soil testing methods and soil test based fertilizer recommendations is made available to farmers on the basis of spot soil testing report through Soil Test Kits and mobile STLs.

Gujarat

Existing Status

Number of Soil Testing Laboratories	There are 20 soil testing labs which includes 2 mobile vans. Six labs have micronutrient analysis facilities. The programme is being expanded.
Annual analyzing capacity	2,40,000
Capacity Utilization	194.7%
Review of functioning	Information on fertilizer recommendation, reclamation of soils and crop planning etc. is reviewed and put online. Soil health cards are generated and distributed to the farmers.
Constraints	None
Monitoring	Quality of the work is monitored by Deputy Director Agriculture (Soil Coordinator) and Assistant Director Agriculture (Soil Testing Laboratory) by ensuring re-analysis of 5% samples from all the labs.
Number of Soil Health Cards issued	Up to December 2009, 17.37 lakh soil health cards. There are 42.39 lakh farmers in the State.
Preparation of soil fertility map	Preparation of soil maps is under progress.
Involvement of State Agricultural University(s)	During Krishi Mahotsav celebrations, scientists of the University advise the farmers regarding importance of soil health and benefits of soil test based fertilizer use.

Action Plan

Issue soil health cards.	In Swarnim Gujarat 2010 year, it was decided to cover remaining 25.02 Lac farmers under soil health cards program up to Dec. 2010. To complete this task, soil sample collection was started from May 2009. Department has taken the support of science colleges, agricultural produced marketing committee (APMC), State Agriculture University, Gujarat Land Development Corporation (GLDC) and Gujarat State Seed Corporation (GSSC). By December 2010, only 50,000 samples remained to be collected.
Additional labs, Static and mobile are planned to be set up.	• In the beginning of 2009-10 Agriculture Department had 20 STLs including 2 mobile vans. • Under RKVY Project during 2009-10, 61 soil testing labs were sanctioned for various Agriculture Produce Marketing Committee (APMC) and under

	RKVY project during 2010-11, 15 STL were sanctioned for various sugar cooperatives. 32 STLs are already functioning which were sanctioned under RKVY 2009-10. Thus additional labs to be set up would be 108.
Strengthening existing soil testing laboratories for micronutrient testing	Ten new and 10 existing STLs will be provided with micronutrient testing facilities as per proposal of 2010-11 of the State Govt.
Staffing of laboratories	It has been proposed to recruit 100 Assistant Directors of Agriculture and 200 Agriculture Officers.
Preparation of Soil Fertility Maps	Preparation of soil fertility maps is under progress.
Popularizing soil test based application of fertilizers including demonstration and publicity	During Krishi Mahotsav celebrations, scientists of the University advise farmers regarding importance of soil health and benefits of soil test based fertilizer use. In addition, extension functionaries carry out the activities of demonstrations, training and education about soil test based fertilizer use.

Successes/Best Practices

- Govt. of Gujarat has involved, in soil testing programme, other agencies concerned with agriculture like Land Development Corporation, Sugar Cooperative and Agri. Produce Marketing Committee in soil analysis and issue of soil health cards.
- The State Govt. has designed a software in which soil test analysis report, field information, fertilizer recommendation, reclamation of soil and crop planning etc. are entered and online soil health cards are generated and distributed to the farmers.

Haryana

Existing Status

Number of Soil Testing Laboratories	There are 32 STLs and 2 mobile STLs in the State.
Annual analyzing capacity	Annual analyzing capacity of each static STL is 10,000 soil samples and that of each MSTL is 5,000 samples.
Capacity Utilization	90%
Review of functioning	Quality of analysis of all STLs is being monitored by collecting 1% soil samples from all STLs which are checked in the Central/Nodal laboratory at Karnal.
Constraints	• There is a constraint of manpower for which the State Govt. is initiating the process of filling up of vacant posts and has allowed engagement of staff on contractual basis. • There are one lakh hectares of saline soils in the State which need reclamation.
Monitoring	Monitoring is done by Central Lab.
Number of Soil Health Cards issued	• On the basis of soil test reports, soil health cards with fertilizer use recommendations are provided to farmers free of cost. The cards are distributed through concerned ADOs of laboratory personally and sometimes by organizing special camps. • So far 11.41 lakh SHCs have been distributed among the farmers. The State Govt. is committed to provide SHC to all 15.28 lac farmers in the State. The details of SHC and farmers data have been uploaded on the departmental website through which a farmer can print SHC. • To ensure that all farmers get SHCs, it is decided to collect 100 soil samples from each village with contact numbers of farmers and GPS location. This would continue till all land holding are covered.
Preparation of soil fertility map	• GIS based district wise fertility maps are being prepared annually in which village level information is available. • Based on the village wise soil health cards, the Department is able to draw village level fertility maps and area specific policies are being framed to restore soil health. • Maps are prepared for all major and

	micronutrients. • Maps are distributed to extension workers. • Department has also planned to provide village level fertility maps to all the extension workers. • GIS maps have been uploaded on the departmental website www.agriharyana.nic.in. with data of individual farmers.
Involvement of State Agricultural University (s)	Not indicated.

Action Plan

Issue soil health cards	• Govt. has sanctioned 88 new posts for new STLs and MSTLs under NPMSH&F. • All STLs have been provided a silent (Green) 10 KVA diesel power generator and broadband connection for timely analysis so as to enable the labs to send SMS alert to the farmers after the analysis of soil samples. • Existing STLs have been upgraded to some extent by replacing old and un-serviceable equipment with new equipment. • Three Auto Analyzers (ICPs) have been installed one each at Central Lab Karnal, Ambala and Rohtak. ICP is capable of analyzing 300 samples per day for all the parameters (major and micronutrients) except nitrogen.
Additional labs, Static and mobile are planned to be set up	There are 58 Sub-Divisions in the State and the soil testing laboratories are available in 32 Sub-Divisions only, which would be extended to 37 by the end of 2011-12.
Strengthening existing soil testing laboratories for micronutrient testing	Out of existing 32 STLs, micronutrient testing facility is available in 17 labs. The deficient micronutrients in the soils are zinc, iron and manganese.
Staffing of laboratories	Not indicated.
Preparation of Soil Fertility Maps	Soil fertility maps are being prepared. Out of 3 lakh soil samples analyzing capacity, about 1 lakh samples are tested for micronutrient.
Popularizing soil test based application of fertilizers including demonstration and publicity	In addition to sample analysis, each lab adopts 10 villages in its jurisdiction and special campaign is organized in these villages where the farmers are trained on sample collection and about micronutrient deficiency and importance of balance fertilizer use.

	The samples are collected from the adopted villages by the lab staff with GPS location in order to generate a location based data bank. A target of collecting 7 lakh soil samples and their analysis during the year 2011-12 was fixed by the State Govt.

Successes/Best Practices

1. The IT department in the State has developed a website for use of farmers in which online soil test report (soil health cards) are made available. Soil analysis data are available online to the farmers since 2008-09. The farmer has to simply select his district followed by village and the list of farmers and analyzed data will be available with single click. The farmers can also get SHC through this facility.

2. A perusal of soil test reports over a period of 30 years i.e. during 1980-2011, shows that the samples falling into low category of organic carbon have reduced from 80% to 68.4% (1980 to 2011). During the corresponding period samples in the medium category increased from 18% to 31.5% (1980 to 2011). The samples in high category were reduced from 2% to 0.1%. (Source: HAU website).

Himachal Pradesh

Existing Status

Number of Soil Testing Laboratories set up in the State	There are 11 STLs and 4 mobile soil testing vans in the state.
Annual analyzing capacity.	Annual analyzing capacity is 1,25,000 soil samples.
Capacity Utilization	100%
Review of functioning	Yes, it is being reviewed.
Constraints	Training is imparted at regular interval to all the soil testing staff by SAU. However, there is need to provide refresher training for updating latest technology.
Monitoring	Nodal laboratory has been set up at Palampur and strengthened with auto analyzer and all other required equipment & machinery. The quality of testing is being monitored by sending referral samples to the Nodal lab.
Number of Soil Health Cards issued	Up to July 2011, 4,17,431 soil health cards had been issued to the farmers.
Preparation of soil fertility map	Agriculture University at Palampur is preparing soil maps based on GPS system.
Involvement of State Agricultural University(s)	The Agriculture University, Palampur is conducting long term trials and advising the fertilizer use based on soil testing status through package of practices & recommendations given in soil health cards.

Action Plan

Issue soil health cards	Soil health cards are being issued to farmers but as per present capacity it will require 4-5 years to provide soil health cards to all the farmers in the state.
Additional labs, Static and mobile are planned to be set up	State has proposed to set up 8 mobile soil testing labs to cover all the districts. Six existing STLs have been proposed for strengthening and one new lab is proposed under PPP mode during 2011-12 under NPMSH&F.
Strengthening existing soil testing laboratories for micronutrient testing	All existing STLs are having facilities of micronutrient testing but there is need to replace all equipment under strengthening programme.
Staffing of laboratories.	Shortage of staff is being experienced due to retirement but efforts are being made to train the existing staff and fill up vacant post.
Preparation of Soil Fertility Maps	The soil fertility map has been prepared but due to creation of new blocks, map is being updated. Based on

	GPS system, digital soil maps are being prepared by SAU Palampur.
Popularizing soil test based application of fertilizers including demonstration and publicity.	Under the flagship programme of the State Govt., soil testing is being popularized in the State. Demonstrations and training are also being imparted to the extension functionaries and farmers. Judicious use of nutrients is being advised based on soil testing status.

Jharkhand

Existing Status

Number of Soil Testing Laboratories	There are 19 static and 3 mobile soil testing laboratories in the State.
Annual analyzing capacity	Analyzing capacity of each lab is 10,000 soil samples per year. Thus, the total annual analyzing capacity of all the laboratories is 2,20,000 soil samples.
Capacity Utilization	The capacity utilization is 40%.
Review of functioning.	Yes, the functioning is being reviewed periodically.
Constraints	There is no constraint regarding infrastructure. However, there is severe shortage of manpower.
Monitoring	Monitoring is being done by soil testing laboratory of State Agricultural University which is designated as a Nodal laboratory.
Number of Soil Health Cards issued (Year wise)	Around 1,60,000 soil health cards (SHC) have been issued so far.
Preparation of soil fertility map	District level soil fertility maps of 22 districts have been prepared by National Bureau of Soil Survey and Land Use Planning, Kolkata. Preparation of block level soil fertility map of Dumka, Jamtara and Hazaribagh districts is in progress under RKVY schemes.
Involvement of State Agricultural University(s)	The soil testing laboratory of state agricultural university has developed soil test based fertilizer recommendation for advising farmers for application of manures and fertilizers. These recommendations are followed by all the soil testing labs in the state for advising farming community.

Action Plan

Issue soil health cards	102.39 lakh soil health cards have been issued during 2011-12. The entire State will be covered by 2013-14.
Additional labs, Static and mobile are planned to be set up	Under RKVY, 8 more STLs and under State Plan, 25 new STLs have been planned to be set up by 2011-12 and 2012-13 respectively.
Strengthening existing soil testing laboratories for micronutrient testing	Atomic Absorption Spectro-photometer (AAS) and spectrometers have been procured and installed in all 19 STLs and 3 MSTLs. Training of manpower has been planned to be undertaken by Agricultural University, Ranchi.
Staffing of laboratories	It has been planned to run the STLs under Public Private Partnership (PPP) mode.
Preparation of Soil Fertility Maps	The State Agricultural University has been involved for preparation of block level soil fertility maps and for

	updation of district level maps.
Popularizing soil test based application of fertilizers including demonstration and publicity.	At present, Krishi Vigyan Kendras (KVKs) have been asked to do this work through training and demonstration. A plan to involve print and electronic media is under way.

Successes/Best Practices

- There has been a rise in the awareness among villagers about judicious use of chemical fertilizers.
- Documentation about best practices along with suitable photographs is in progress.

Karnataka

Existing Status

Number of Soil Testing Laboratories	There are 22 functioning soil testing laboratories in the State. Under NPMSH&F 35 STLs are proposed to be established.
Annual analyzing capacity	The analyzing capacity of existing 22 STLs in the State is 1,75,000 samples per year.
Capacity Utilization	During 2009-10, a total of 1,24,244 samples were analyzed with 70.9% capacity utilization.
Review of functioning	Functioning of these labs is reviewed every month by the concerned Join Director of Agriculture at District level and also by the Director of Agriculture.
Constraints	Not indicated.
Monitoring	Soil testing laboratory at Bangalore has been designated as a Nodal laboratory for monitoring the quality of the work carried out by all the soil testing labs in the State.
Number of Soil Health Cards issued	So far 30,07,303 soil health cards have been issued.
Preparation of soil fertility map	Not indicated.
Involvement of State Agricultural University(s)	• The Agricultural officers working in the soil testing laboratories (soil health centers) and also the extension personnel are trained at the State Agricultural University. • Farmers trainings are organized at the District Agricultural Training Centers by utilizing the services of soil scientists from State Agricultural Universities/ KVKs.

Action Plan

Issue soil health cards	In Karnataka, there are 75,80,873 farm holdings. So far 30,07,303 soil health cards have been issued. The remaining farm holdings will be tested and 45,73,570 samples will be analyzed by the end of 2030 and soil health cards will be issued.
Additional labs, Static and mobile are planned to be set up	• State Govt. is planning to set up 35 new soil testing laboratories. Out of the planned 35 STLs, 21 are proposed to be set up by private agencies and 14 by

	the State Govt.
Strengthening existing soil testing laboratories for micronutrient testing	Existing laboratories are proposed to be strengthened to enable them to analyze micronutrients also.
Staffing of laboratories	State is planning to create required posts and also short term hiring of personnel under RKVY scheme.
Preparation of Soil Fertility Maps.	Not indicated.
Popularizing soil test based application of fertilizers including demonstration and publicity.	Farmers are trained in soil sample collection and about the importance of application of balanced fertilizers including micronutrients. Training is also imparted about adoption of improved crop production technologies including INM and IPM practices.

Successes/Best Practices

Bhoochetna programme is being implemented in Karnataka with main objective of increasing 20% yield in rain fed areas in association with ICRISAT and State Agricultural Universities. Under this programme main emphasis is given for maintenance of soil health and application of both macro and micro nutrients based on soil sample collection. Bhoochetna programme was implemented in 6 Districts in 1st phase during 2009-10. The increase in crop yield was to the extent of 23-30%. The scheme was extended to 9 Districts during 2010-11. It will be implemented in another 9 Districts during 2011-12. Farmer's facilitators are appointed and trained in soil sample collection and about crop production. There are assigned 500 ha each. These facilitators are functioning as a linkage between Department and farmers in dissemination of technology. Results of long term fertilizer trials have shown the build up of organic carbon under NPK treatment at Bangalore centre.

Kerala

Existing Status

Number of Soil Testing Laboratories	There are in all 24 soil testing laboratories which include 14 district soil testing labs, 9 mobile labs and one central soil and plant healthcare lab in the State.
Annual analyzing capacity	2,88,000 soil samples per annum.
Capacity Utilization	55%
Review of functioning	Functioning of the laboratories is periodically reviewed by the Chief Soil Chemist and the Director of Agriculture.
Constraints	• Inadequate staff • Frequent transfer of officers • Delay in transporting samples from collection centres to labs. • Interruption in power supply and lack of good quality water.
Monitoring	• District level monitoring is done by the Deputy Director (Water Management) and Assistant Soil Chemist. • Block level monitoring is done by the Assistant Director of Agriculture.
Number of Soil Health Cards issued	During 2010-11, 1,59,333 soil health cards were issued and during 2011-12 (up to 9/11) 50,500 soil health cards were issued.
Preparation of soil fertility map	Fertility maps have been prepared up to the year, 2009. The maps for 2010 onwards are under preparation.
Involvement of State Agricultural University(s)	Soil test based fertilizer and manure use recommendations is given in the soil health cards, based on the package of practices standardized by the Kerala Agricultural University.

Action Plan

Issue soil health cards	During the year 2011-12, a total of 1,60,000 soil health cards will be issued.
Additional labs, Static and mobile are planned to be set up.	During 2011-12, five new mobile soil testing labs will be established by the Department of Agriculture. Three static and 2 mobile labs will be established by the Kerala Agricultural University with funds from the Department.

Strengthening existing soil testing laboratories for micronutrient testing.	Three numbers of AAS have already been installed. Eight numbers of AAS will be purchased and installed in a phased manner in the coming years.
Staffing of laboratories	All vacancies will be filled up.
Preparation of Soil Fertility Maps.	The fertility maps for 23 Agro-ecological zones of the state will be prepared for which the soil sample collection has been completed and analysis is being carried out.
Popularizing soil test based application of fertilizers including demonstration and publicity.	Field level demonstrations and campaigns will be conducted under central and state schemes.

Successes/Best Practices

1. The district soil testing laboratory, Kasargod District which is a border district with Karnataka, with its limited infrastructure has prepared comprehensive fertility maps for each panchayats and issued bilingual (Malayalam and Kannada) soil health cards to all the farmers. The project was taken up with a financial assistance of local Self Government, Kasargod.
2. The State will implement a new scheme during 2011-12 for popularizing manures and fertilizers application based on soil health cards:

- 230 reference plots have been selected from within 5 cropping patterns in the State.
- One Panchayat from each district will be adopted by the district soil testing laboratory.
- All the basic data like holding size, details of productivity etc. will be collected and incorporated in the base maps already available with the district soil survey unit.
- Soil samples representing different parts of the Panchayat will be collected and soil health cards will be prepared.
- A total of 15 demonstration plots having 30 cent minimum area under different cropping pattern will be selected from the adopted Panchayat to demonstrate the input application, based on soil health cards.
- Assistance will be given to the tune of Rs. 3,600/- to Rs. 12,000/- base of the crops for the application of inputs as per the soil test data.
- Frequent visits by the departmental staff will be made to monitor the implementation of the scheme.
- The farmers of the Panchayat will be motivated to adopt the technologies used in the demonstrations plots through different activities to increase the productivity of their crops to the level of the reference plot selected.

Madhya Pradesh

Existing Status

<table>
<tr><td>Number of Soil Testing Laboratories</td><td>There are 24 State Govt., 26 Mandi Board and 25 SAUs (Total 75) along with 3 mobile STLs functioning in the state.</td></tr>
<tr><td>Annual analyzing capacity</td><td>Maximum capacity of analyzing 10,000 samples per year in each lab.</td></tr>
<tr><td>Capacity Utilization.</td><td>The capacity utilization is 70%</td></tr>
<tr><td>Review of functioning</td><td>Functioning is reviewed time to time at Districts and State level.</td></tr>
<tr><td>Constraints</td><td>Lack of qualified manpower and supporting staff is the main problem.</td></tr>
<tr><td>Monitoring</td><td>1. Monitoring of soil testing laboratories is done by the Joint Directore of Agriculrture at division level and Deputy Director Agriculture at district level.
2. State level weekly monitoring through video conferencing is also done.
3. Chhindwara STLs has been identified as a Nodal laboratory and orders will be issued earlier.</td></tr>
<tr><td>Number of Soil Health Cards issued</td><td>
<table>
<tr><th>S. No.</th><th>Year</th><th>Soil Health Card Generated</th></tr>
<tr><td>1</td><td>2002-03</td><td>105612</td></tr>
<tr><td>2</td><td>2003-04</td><td>121498</td></tr>
<tr><td>3</td><td>2004-05</td><td>141126</td></tr>
<tr><td>4</td><td>2005-06</td><td>174892</td></tr>
<tr><td>5</td><td>2006-07</td><td>192190</td></tr>
<tr><td>6</td><td>2007-08</td><td>177194</td></tr>
<tr><td>7</td><td>2008-09</td><td>170547</td></tr>
<tr><td>8</td><td>2009-10</td><td>138417</td></tr>
<tr><td>9</td><td>2010-11</td><td>224752</td></tr>
<tr><td>10</td><td>2011-12</td><td>141654</td></tr>
<tr><td></td><td>Total</td><td>1460882</td></tr>
</table>
Since 1.04.2009, 6.28 lakh soil health cards have been</td></tr>
</table>

	issued to farmers so far.
Preparation of soil fertility map.	Preparation of soil fertility maps is proposed to be undertaken as PPP mode work.
Involvement of State Agricultural University(s).	The State Agricultural Universities are helping the farmers in adopting soil test based balance use of fertilizers by organizing demonstrations, trainings and through State Kisan Call Centres.

Action Plan

<table>
<tr><td>Issue soil health cards</td><td>Govt. of Madhya Pradesh has decided to provide Soil Health Card free of cost to each farmer of the state for his one land holding. To complete this task department proposed a project under PPP mode. Government also renovating soil testing laboratories. At present out of 24 departmental STLs 16 STLs has been renovated till date and rest are under process.</td></tr>
<tr><td>Additional labs, Static and mobile are planned to be set up</td><td>54 Mandi Board STLs are under construction in the state. An amount of Rs 877.66 lac were sanctioned under RKVY to purchase of all new equipments along with AAS for the department STLs is continue and may be done by the end of March, 2012.</td></tr>
<tr><td>Strengthening existing soil testing laboratories for micronutrient testing</td><td>Strengthening of all STLs for micronutrient analysis is under progress.</td></tr>
<tr><td>Staffing of laboratories.</td><td>The staffing pattern is as follows:
<table>
<tr><th>S.No</th><th>Designation</th><th>No. of approved post</th></tr>
<tr><td>1</td><td>Assistant Soil Testing/Soil Survey Officer</td><td>1</td></tr>
<tr><td>2</td><td>Senior Agriculture Development Officer</td><td>2</td></tr>
<tr><td>3</td><td>Agriculture Development Officer</td><td>2</td></tr>
<tr><td>4</td><td>Lab Assistant</td><td>2</td></tr>
<tr><td>5</td><td>Accountant</td><td>1</td></tr>
<tr><td>6</td><td>Asst. Grade II</td><td>1</td></tr>
<tr><td>7</td><td>Asst. Grade III</td><td>1</td></tr>
<tr><td>8</td><td>Lab Attendent</td><td>1</td></tr>
</table></td></tr>
</table>

	9 | Watchman | 1 **Total** | **12** • Training of all STLs staff for proper sampling, analysis and balance use of fertilizers will be arranged at Indian Institute of Soil Science and SAUs.
Preparation of Soil Fertility Maps	• Government of Madhya Pradesh has decided to prepare village, block and district wise soil fertility maps and index of macro and micro nutrients within 12th Five Year Plan. • Digital Fertility Map will be generated after preparation of 10% soil Health Card of each district.
Popularizing soil test based application of fertilizers including demonstration and publicity	• Every year in all district "KRISHI MELA" is being organized under ATMA yojna wide publicity will be given through scientific lectures, stalls, pumplets etc. for the balance use of fertilizers based on Soil Health Card/ Soil Test Report. • Radio, TV, magazenes, newspaper articles also playing important role in publicity. • Field Demonstration and FrontLine Demonstration (FLDs) on farmers field are being conducted in all district under ATMA for popularizing the fertilizer use as per Soil Test Reports and recommendations made on Soil Health Cards.

Successes/Best Practices

LTFE Experiment: Long term fertility experiments have revealed build up of organic carbon under NPK treatment at Jabalpur centre.
AGRISNET: Latest techlogy, information of state agriculture schemes, applications forms for the schemes are available online. package and practices of important crops of the state, mandi rates, weather reports and many more information are available on department URL www.mpkrishi.org
COMMUNITY RADIO STATION: The first Korku Community Radio station of Madhya Pradesh will go on air at Khalwa in Khandwa district. It will be run and broadcast by the tribal community in Korku dialect. The radio station has been set up by Vanya of Tribal

Welfare Department. It will play an important role in spreading knowledge about government's various welfare schemes and will also act as a bridge between the people and the government.
KISAN CALL CENTRE: State Govt. started a Kisan Call Center (Toll Free Number 1800-233-4433) for any query related to Agriculture, Horticulture , Veterinary .

Maharashtra

Existing Status

Number of Soil Testing Laboratories	Number of STLs in the State is as follows: • Govt. static soil testing labs at district level = 29. • Private static soil testing labs at various levels = 81. • Mobile soil testing labs = 4.
Annual analyzing capacity.	Annual soil sample analyzing capacity is as follows: 1. Govt. labs. • N, P, K soil sample analysis = 2,00,000. • Micronutrient analysis = 2,00,000. 2. Non-Govt. labs. • N, P, K soil sample analysis = 1,50,000. • Micronutrient analysis = 1,50,000.
Capacity Utilization	Utilization of analyzing capacity is 88.8%.
Review of functioning	Functioning of the labs is reviewed at State level bi-monthly. Regular inspection is carried out by the Joint Director at Divisional level and at District level by District Superintendent Agricultural Officer.
Constraints	• Regular annual maintenance contract of imported equipment like AAS and others is necessary. Funds have to be made available for this purpose. • Funds are required for wages of lab attendant. • There is a need of trained and qualified manpower in the labs. • There is also need of IT trained manpower for interpretation of analysis reports and preparation of recommendations and their online communication.
Monitoring	• The quality of work of the labs is monitored under the supervision of Dist. Superintendent. Agri. Officers by inspection at every month and report is submitted to Divisional Joint Director of Agriculture. • The State level officer also inspects the soil testing

	labs frequently for monitoring the quality of analysis.
Number of Soil Health Cards issued	Year wise distribution of soil health cards is as follows: • Year 2006-07 = 3.03 lakhs • Year 2007-08 = 3.44 lakhs • Year 2008-09 = 2.17 lakhs • Year 2009-10 = 2.78 lakhs • Year 2010-11 = 2.95 lakhs • Year 2011-12 = 1.49 lakhs (up to July 2011) Total = 15.86 lakhs
Preparation of soil fertility map	Based on soil samples analyzed in Govt. soil testing labs during 2005-10, Talukawise (block wise) and district wise soil fertility index have been generated for major and micronutrient by adopting Parker's index formula. Block wise soil fertility maps have been prepared for each nutrient and is made available on website of Agriculture Department of the state.
Involvement of State Agricultural University(s)	There are 4 State Agricultural Universities in the State. These SAUs have given recommendations of fertilizer doses for crops by adopting six tier system viz. very low, low, moderate, moderately high, high and very high. These recommendations are given to the farmers in soil health cards in the form of straight fertilizers.

Action Plan

Issue soil health cards	The State Govt. has plans to issue soil health cards to all the farmers in the state.
Additional labs, Static and mobile are planned to be set up	• Under the Centrally Sponsored Scheme- NPMSH&F, 12 new static and 8 new mobile soil testing labs have been sanctioned in PPP mode. Process of establishment of these labs is in progress. • Till September, the State Govt. has received 45 proposals to set up static and 32 proposals for MSTLs in PPP mode. The process of sanctioning is in progress. • The State Govt. has planned to establish new Govt. STLs at Nandubar, Washim, Hingoli and Gondiya district headquarters.
Strengthening existing soil testing laboratories for micronutrient testing	• All the Govt. STLs are having the facility of micronutrient testing. • The State Govt. has planned to strengthen the existing Govt. STLs with ICP and other advanced equipment for Divisional level STLs at 8 locations.

<table>
<tr>
<td>Staffing of laboratories.</td>
<td>

The staffing pattern for Govt. STLs is as follows:

<table>
<tr><th>Sl. No.</th><th>Designation</th><th>No. of approved post</th></tr>
<tr><td>1</td><td>District soil survey and soil testing officer</td><td>1</td></tr>
<tr><td>2</td><td>Agri. supervisor</td><td>2</td></tr>
<tr><td>3</td><td>Agri Assistant</td><td>4</td></tr>
<tr><td>4</td><td>Senior Clerk</td><td>1</td></tr>
<tr><td>5</td><td>Junior Clerk</td><td>2</td></tr>
<tr><td>6</td><td>Tracer</td><td>1</td></tr>
<tr><td>7</td><td>Driver</td><td>1</td></tr>
<tr><td>8</td><td>Peon</td><td>2</td></tr>
<tr><td></td><td>Total</td><td>14</td></tr>
<tr><td colspan="3">Additional staff required:</td></tr>
<tr><td colspan="3">1. Agri. Officer = 1, to monitor lab work.
2. Computer Operator = 1, for interpretation of data.</td></tr>
</table>

Staffing pattern for STLs set up under PPP mode:

<table>
<tr><th>Sl. No.</th><th>Designation</th><th>No. of approved post</th></tr>
<tr><td>1</td><td>Laboratory Incharge</td><td>1</td></tr>
<tr><td>2</td><td>Lab. Supervisor</td><td>1</td></tr>
<tr><td>3</td><td>Soil Analyst</td><td>5</td></tr>
<tr><td>4</td><td>Lab. Attendant</td><td>3</td></tr>
<tr><td>5</td><td>Clerk</td><td>1</td></tr>
<tr><td></td><td>Total</td><td>11</td></tr>
</table>

Staffing pattern for MSTLs set up under PPP mode:

<table>
<tr><th>Sl. No.</th><th>Designation</th><th>No. of approved post</th></tr>
<tr><td>1</td><td>Laboratory Incharge</td><td>1</td></tr>
<tr><td>2</td><td>Lab. Supervisor</td><td>1</td></tr>
<tr><td>3</td><td>Soil Analyst</td><td>2</td></tr>
<tr><td>4</td><td>Lab. Attendant</td><td>2</td></tr>
<tr><td>5</td><td>Driver</td><td>1</td></tr>
<tr><td></td><td>Total</td><td>7</td></tr>
</table>

Training of Staff:

</td>
</tr>
</table>

	i) Training of officers for balanced use of fertilizer and INM will be arranged at Vasantrao Naik Agri Management Training Instt. (SAMTI) and SAUs. ii) Training programme for soil testing labs staff and extension workers will be arranged at Regional Agricultural Management Training Instt. (RAMTI) iii) Training programme on analytical procedures for lab staff of Govt. and Private labs will be arranged at District level soil testing labs and SAUs.
Preparation of Soil Fertility Maps	• The State Govt. has plans to issue village wise soil fertility index for major and micronutrients under Rashtriya Krishi Vikas Yojana (RKVY) and all villages will be covered within 5 years. • The fertility index of each village will be plotted on Cadastral digital Map. • Nutrient recommendations for major crops in the village will be prepared and displayed at public places of villages and the farmers will be advised to use the fertilizers as per these recommendations.
Popularizing soil test based application of fertilizers including demonstration and publicity	• Every year Krishi Dindi, Krishi Melas and Exhibition will be organized and wide publicity will be given for balanced use of fertilizers on the basis of soil test reports. • Publicity through TV and Radio, Newspapers articles, Posters and Pamphlets will be made. • Field demonstrations and frontline demonstrations are being organized in all districts under ATMA for creating awareness among the farmers for fertilizer use as per soil test recommendations and also about the importance of soil health cards.

Meghalaya

Existing Status

Number of Soil Testing Laboratories	There are 3 static and 1 mobile soil testing laboratory in the State. The static laboratories were established in 1973 and have been functional since. The mobile soil testing laboratory is located at Shillong. Two more mobile labs are being proposed to be set up.
Annual analyzing capacity	The annual soil sample analyzing capacity is 30,000 for NPK and 827 for micronutrients.
Capacity Utilization	The capacity utilization is 90%.
Review of functioning	Functioning of the laboratories is reviewed once a year.
Constraints	• The main constraint in all the laboratories is space. The laboratories are working in the same space since their creation while the requirement of analysis has been increased by including water, plant and also fertilizers. The facilities for micro nutrient analysis also need additional space. • The laboratories do not have qualified/trained staff; hence there is need for training. • There is ban on creation of new posts.
Monitoring	A Nodal laboratory has just been notified and monitoring will start.
Number of Soil Health Cards issued	During 2009-10, 8,829 soil health cards were issued. During 2010-11, 9,716 cards were distributed to the farmers of East Khasi Hills, Jaintia and West Garo Hills.
Preparation of soil fertility map	Preparation of soil fertility map is in progress. Maps of some blocks have been completed.
Involvement of State Agricultural University (s)	At present, the Agricultural University is not involved. The department has worked out the recommendations, based on soil test crop response studies.

Action Plan

Issue soil health cards	Yes, soil health cards are being issued to the farmers. A system for issue of 'online' soil health card is being developed for the benefit of farmers. If additional static and mobile soil testing laboratories are set up, the target of supplying SHCs to all the farmers may be reached by 2020.
Additional labs, Static and mobile are planned to be set up	Two static soil testing laboratories along with one mobile soil testing laboratory were planned to be set up in each of two Districts namely Nongstoin and Williamnagar. In fact building to house these laboratories are already in place. Constraints of funds and Govt. policy of ban on creation of new post have limited the progress.
Strengthening existing soil testing laboratories for micronutrient testing	A need for supply of atomic absorption spectrophotometer has been indicated. Some micronutrient analysis is being carried out in some labs.
Staffing of laboratories	Owing to the State's fund constraint, creation of posts will be difficult. However, staff may be hired on contract basis for mobile soil testing laboratories. The regular and contractual staff will be given training on soil analysis at State Agricultural Management Extension and Training Institute.
Preparation of Soil Fertility Maps	Maps are proposed to be prepared by the officers of the State after their training.
Popularizing soil test based application of fertilizers including demonstration and publicity.	• Every year Kharif and Rabi Campaigns are organized where publicity is given about importance of soil test based fertilizer application. • For popularizing soil test based application of fertilizers, field demonstrations and front line field demonstrations are being organized in all the districts in the State, under the National Project on Management of Soil Health & Fertility and also under State plan schemes.

Successes/Best Practices

1. The soil test based fertilizer use recommendations are known to be popular among the farmers. 2. Some results of soil test based fertilizer use trials and the fertilizer use by farmers have been given.

Mizoram

Existing Status

Number of Soil Testing Laboratories	There are 3 Static and 3 mobile STLs in the State.
Annual analyzing capacity	Annual analyzing capacity of the existing laboratories is 34,000 soil samples per year.
Capacity Utilization	Capacity utilization is 100%.
Review of functioning	There is no system of regular review.
Constraints	• The available instruments in both the old labs are out dated, non functional and beyond repair. • There are no qualified analysts. • Field soil testing kits are used for testing the soils.
Monitoring	There is no system of regular monitoring the programme in the State.
Number of Soil Health Cards issued	Soil health cards were issued as follows: 2007-08 = 40,000 . 2008-09 = 20,000 2009-10 = 20,000
Preparation of soil fertility map	Soil fertility maps are not being prepared due to constraints of infrastructure and manpower.
Involvement of State Agricultural University(s).	There is no SAU in the State.

Action Plan

Plan to Issue soil health cards	It is planned to issue soil health cards to all farmers except Jhumia families by the end of 2012.
Additional labs, Static and mobile labs planned to be set up	• The existing 2 labs, 1 each at Capital and Lujglei in the South will be strengthened. • 3 Mobile STLs sanctioned under NPMSHF have been set up.
Strengthening existing soil testing laboratories for micronutrient testing	In static STLs, 2 numbers of AAS have been provided for micronutrient testing.
Staffing of laboratories	Qualified persons will be engaged on contract basis under NPMSHF, for which approval of State Govt. is being sought. Creation of permanent posts will be followed.
Preparation of Soil Fertility Maps	Maps will be prepared after the availability of qualified staff. Soil survey of the whole State is under way.

Popularizing soil test based fertilizer use including demonstration and publicity	Soil test based application of fertilizers, farmers' training, laying out of demonstrations and publicity will be carried out as per availability of funds.

Successes/Best Practices

A Mobile clinic for soil testing is organized in the remote areas. Farmers are very enthusiastic and come forward with their soil for analysis. The programme is broadcast through local cable network.

Orissa

Existing Status

Number of Soil Testing Laboratories	Before the beginning of 11th Plan, there were 11 static and 1 mobile laboratories.
Annual analyzing capacity	The analyzing capacity of 12 labs was 1,20,000 samples per year. The capacity is being increased with establishment of new labs and strengthening of existing labs. At the end of the 11th Plan, it is expected that there would be 33 Static STLs and 24 mobile STLs. The projected analyzing capacity is about 4,00,000 samples per year. The existing 11 labs have been strengthened with micronutrient testing facility.
Capacity Utilization	It varies between 92% (2007-08) to 99% (2009-10).
Review of functioning	The State Govt. has extensively reviewed the program and proposed its strengthening to increase the analysis capacity from 1,20,000 samples per year to 4,00,000 samples per year.
Constraints	Shortage of qualified manpower hampers the functioning of the labs. Short term hiring and out sourcing is one of the ways to carry out work. Such persons would need intensive training before undertaking the task.
Monitoring	Functioning of the Soil testing labs is monitored by the Director of Agri & Food Production. Soil testing Lab at Bhubaneswar has been declared as a Nodal Lab that will undertake monitoring of quality in soil testing program.
Number of Soil Health Cards issued	During last 10 years, 10 lakh soil samples have been tested and soil health cards have been provided to farmers based on these reports.
Preparation of soil fertility map	• The data on last 10 years sample analysis are being compiled and soil fertility map would be prepared shortly. • A map indicating status of secondary and micronutrients is also expected to be completed by the end of 2011.
Involvement of State Agricultural University (s)	The Orissa University of Agriculture and Technology (OUAT) provide scientific and technical support to the program. It remains effectively involved in the program.

Action Plan

Issue soil health cards	• Already 10 lakh cards have been provided, based on last 10 years of soil test data. • Soil testing kits have been provided to all blocks for analyzing 200 samples per block. Based on such analysis, during last 3 years i.e. 2007-08 to 2009-10, 96,207 soil

	health cards have been issued. • With enhanced analyzing capacity, 4,00,000 soil health cards are expected to be issued yearly starting from the year, 2013.
Additional labs, Static and mobile are planned to be set up	22 static and 23 mobile labs are proposed to be established by the State Govt. by 2013.
Strengthening existing soil testing laboratories for micronutrient testing	• Seven labs are being provided with AAS facilities for micronutrient testing. • It is planned to collect 55.000 geo referenced soil samples from the entire State covering all the gram panchayats and will be analyzed for Secondary and Micronutrients.
Staffing of laboratories	The process has been initiated to place core staff in the newly created labs (as well as filling up vacant posts in the old labs) and engaging the supporting staff through short term hiring and out sourcing.
Preparation of Soil Fertility Maps.	Soil Fertility Map has been prepared based on last 10 years data. In future, this practice will continue. It has been planned to prepare digital district maps and make the same web enabled so as to cater the requirement of farmers and other users in remote corner of the State.
Popularizing soil test based application of fertilizers including demonstration and publicity.	• Popularization of integrated nutrient management for soil health management is a major mandate of the State Agriculture Policy. Farmers are encouraged to practice INM and special assistance is being provided to use organic manure, bio-fertilizers and soil amendments etc. • There are large acidic areas in the State hence Phospho-Gypsum is being supplied to the farmers @ Rs. 14.25 per 50 kg bag. Paper mill sludge is also supplied @RS. 10 per 50 kg bag. The recommendations are soil test based. The use of these products will supply calcium and sulphur. These elements are helpful in oil seed crops grown in acid soils.

Successes/Best Practices

1. The soil test data are being put on website to make them accessible to the farmers even in the remote areas of the State.

2. Digital district maps also being prepared for secondary and micronutrients.

3. About 70% of the soils in the State are acidic in nature which hampers crop growth. Ground nut is a major crop which requires high amount of sulphur. In view of this, supply of Phospho Gypsum and lime is taken as an important programme accompanied by testing of soils for calcium, sulphur content and lime requirement.

4. Long term fertilizer use trials have shown the build up of organic carbon at Bhubaneshwar centre.

Punjab

Existing Status

Number of Soil Testing Laboratories	There are 58 soil testing laboratories working in the State out of which 54 laboratories are static and 4 are mobile STLs.
Annual analyzing capacity	Analyzing capacity is 5,50,000 soil samples per annum.
Capacity Utilization	Utilization is only 45% and is reportedly low due to shortage of staff.
Review of functioning	20 labs (1 lab from each district) are being strengthened with AAS so that the testing of micronutrients could be started throughout the State.
Constraints	Most of labs have old equipments which need to be replaced. Out of 58 laboratories only 37 have sanctioned staff. 174 posts have been filled against 319 sanctioned posts. In these 37 laboratories 13 posts of ADO technical are filled out of 53 sanctioned posts.
Monitoring	Not indicated
Number of Soil Health Cards issued	Number of SHC issued, year wise: 3,17,271 (2007-08); 2,70,767 (2008-09); 2,97,616 (2009-10)
Preparation of soil fertility map	Soil fertility maps are not prepared for last 5 years due to shortage of staff. As the staff position improves, work of preparing soil fertility maps will be started.
Involvement of State Agricultural University (s)	State Agriculture University has been allotted funds under RKVY to work out area and crop specific fertilizer needs.

Action Plan

Issue soil health cards	During 2010-12 labs are being strengthened and 6 lakh soil health cards will be issued to farmers during this period.
Additional labs, Static and mobile are planned to be set up	3 mobile soil testing labs are being set up. For this purpose, funds have been received from GOI. The purchase of equipments is under process.
Strengthening existing soil testing laboratories for micronutrient testing	20 existing STLs are being strengthened to analyse micronutrients in soils. For this purpose, grant has been received from GOI and purchase of Atomic Absorption Spectrophotometer (AAS) is under process.
Staffing of laboratories	The State Govt. is aware about need for filling up of posts with qualified staff in the soil testing laboratories.
Preparation of Soil	Soil fertility maps are not prepared for last 5 years due to

Fertility Maps	shortage of staff. As staff position improves, the work of preparing soil fertility maps will be started.
Popularizing soil test based application of fertilizers including demonstration and publicity	To demonstrate the benefits of balanced use of fertilizer on the basis of soil testing and about the use of micronutrients, a scheme under NPMSHF has been sent to GOI for approval.

Successes/Best Practices

1. Two labs are working well i.e. one owned by Markfed and another by National Fertilizer Limited. During the year 2009-10, had analyzed 24,158 and 1,47,09 samples respectively. Besides this, a Govt. soil testing laboratory has also been out sourced by a private agency. In this laboratory, there is a facility for analysis of soil, water and leaf. The fertilizer recommendation for horticulture crops are also being done on the basis of leaf analysis.

2. A weighted average for the whole State based on a study for the period during 1981-82 to 2005-06 about the change in soil fertility indicates that there is increase of 38% in the content of organic carbon and over 50% increase in phosphorus content while the potassium content remained almost unaltered under the major cropping system of rice-wheat rotation. The pH declined by 0.8 unit from 8.5 to 7.7 in the corresponding period.

Rajasthan

Existing Status

Number of Soil Testing Laboratories	There are 33 static soil testing laboratories in the State which function under the State department of agriculture. In addition 26 mobile soil testing laboratories have been set up under Public Private Partnership mode (PPP), which started functioning with effect from 04.08.2010.
Annual analyzing capacity	• Departmental STLs = 3.5 lac soil samples / annum. • PPP mode MSTLs = 2 lac soil samples/ annum after completion of the establishment of these laboratories.
Capacity Utilization	• Departmental labs = 82.39% (2010-11) • PPP mode MSTLs = 46.91% (August 2010 to March 2011)
Review of functioning	• Departmental labs: monthly and seasonal review. • PPP mode STLs: Quarterly review.
Constraints	There is a limitation of staff which, however, is under the consideration of the State Govt.
Monitoring	A State level committee under the chairmanship of Additional Director Agriculture (Research) reviews the functioning of the laboratories.
Number of Soil Health Cards issued (Year wise)	3.5 lakh in 2006-07; 3 lakh in 2007-08; 3 lakh in 2008-09; 2.85 lakh in 2009-10; 3.12 lakh in 2010-11.
Preparation of soil fertility map	Panchayat samiti wise soil fertility maps have been prepared and distributed to Panchayat samities, AAO, AD (Extn.) and Fertilizer Dealers etc.
Involvement of State Agricultural University (s).	Involvement of Agricultural University is there in upgradation and renewal of soil test based fertilizer use recommendations.

Action Plan

Issue soil health cards	61.86 lakh soil health cards will be distributed in next 3 years under RKVY scheme in project mode.
Additional labs, Static and mobile are planned to be set up	14 static soil testing laboratories will start functioning during 2011-12.
Strengthening existing soil testing laboratories for micronutrient testing	32 departmental laboratories are having micronutrient testing facilities.
Staffing of laboratories	The proposal for required staff is under the consideration of the Finance Department of the State Govt.

Preparation of Soil Fertility Maps	Preparations of State and District wise soil fertility maps are in progress
Popularizing soil test based application of fertilizers including demonstration and publicity	Extension activities like farmers training, campaign, kissan mela and special Kharif and Rabi campaigns are organized for enhancing adoption of soil test based fertilizer use recommendation in the State.

Successes/Best Practices

1. The State Govt. has completed soil fertility survey for all villages and based on this, 52.5 lac village wise soil health cards and package of practice cards have been distributed. Soil test of each farm is under progress.

2. On these cards, on one side village level nutrient status and fertilizer use recommendations are printed while on the other side improved agronomic practices are depicted. In each village 100 copies of such cards are distributed.

3. In the highest fertilizer consuming district namely Sriganganagar, farmers are specifically encouraged to use balanced fertilizers as per the recommendations contained in the soil health cards.

Tamil Nadu

Existing Status

Number of Soil Testing Laboratories set up in the State.	There are 30 STLs and 18 Mobile STLs working in the State.
Annual analyzing capacity.	• 30 STLs analyze 8,44,800 samples annually, 18 MSTLs analyze 2,88,000 soil samples. Total number of soil samples analyzed is 11,32,800 per annum. • A total of 3,59,601 water samples were also analyzed by the STLs/ MSTLs during one year.
Capacity Utilization	The capacity utilization is 100%
Review of functioning	The functioning of the labs is reviewed every quarter by the Additional Director Agri. (Research). Monthly reviewing at the district level has been suggested.
Constraints	• Space: 9 STLs are functioning in the rented building. New buildings are considered necessary. • 21 STLs are functioning in Govt. buildings, many of which are in dilapidated conditions and need proper maintenance. • Manpower: 128 Agri. Officers are working in STLs and 48 in MSTLs. • Training – Training is periodically given at the Central Lab, Kudumianmalai.
Monitoring	The Laboratory at Kudumianmalai, Pudukottai District has been declared as central laboratory and it monitors quality of analysis in all laboratories.
Number of Soil Health Cards issued.	The State Govt. has issued 21.75 lakh soil health cards to the farmers during 2009-10.
Preparation of soil fertility map.	The fertility status with regard to major nutrients namely N,P,K for the State has been worked out to find that status of N is Low, P_2O_5 medium and K_2O high. With regard to micronutrients, Zinc is found to be deficient in 64% samples analyzed, Copper in 41%, Manganese in 13% and Iron in 25% samples.
Involvement of State Agricultural University (s)	Tamilnadu Agricultural University has developed a Software – DESSIFER which is used by the STLs for online issue of soil heath cards and also in formulating fertilizer use recommendations.

Action Plan

Issue soil health cards	The State has started issuing soil health cards from the year 2006 onwards and has already issued 21.75 lakh soil health cards.
Additional labs, Static and mobile are planned to be set up	Already 11 new soil testing labs have been set up during 2008 under Macro Management (MMA) Scheme. Thus, one soil testing laboratory is functioning in each district.
Strengthening existing soil testing laboratories for micronutrient testing	An amount of Rs. 110 Lac has been sanctioned for purchase of 11 AAS to be provided in 11 new labs set up under the MMA scheme.
Staffing of laboratories	176 agricultural officers are working in the STLs. Periodical trainings are organized for STLs staff at Central Laboratory, Kudumianmalai.
Preparation of Soil Fertility Maps	Block level soil fertility maps are being prepared by the laboratories.
Popularizing soil test based application of fertilizers including demonstration and publicity	• STLs including MSTLs are organizing demonstrations in some part of the State. • Soil health awareness campaign and village adoption program are being organized by STLs every year.

Successes/Best Practices

The following schemes have been taken up for management of soil health in the State:

- Site specific nutrient management demonstrations
- Implementation of Land Reclamation Program to improve Saline and Alkaline soils
- Popularization of green manure
- Popularization of blue green algae
- Popularization of bio-fertilizers
- Popularization of micronutrient mixture

Tripura

Existing Status

Number of Soil Testing Laboratories set up in the State	There are 2 static and 3 mobile soil testing labs in the State.
Annual analyzing capacity	The annual sample analyzing capacity is 32,000 which includes 22,000 samples analyzing capacity of static labs and 10,000 of mobile labs.
Capacity Utilization	During 2009-10, capacity utilization was 58% while during 2010-11 it was 36%.
Review of functioning	The functioning is reviewed time to time.
Constraints	There are constraints of non availability of proper space, equipment and skilled manpower.
Monitoring	There is no nodal lab in the state of Tripura.
Number of Soil Health Cards issued	Starting from 1999-2000 to 2010-11, a total of 1,00,684 soil health cards along with fertilizer use recommendations have been distributed to the farmers.
Preparation of soil fertility map	District level soil fertility maps have been prepared in collaboration with National Bureau of Soil Survey and Land use Planning, ICAR, Jorhat Centre, to show the available macro and micronutrient status in each district, depiction of site specific problems regarding soil acidity and their management practices. Under NPMSH&F, preparation of 4 district level digital soil maps is in progress in collaboration with Tripura Space Application Centre, Department of Science and Technology.
Involvement of State Agricultural University (s).	There is no Agricultural University in the State.

Action Plan

Issue soil health cards	A total of 1,00,684 soil health cards have been during 1999-2000 to 2010-11. It has been proposed to issue 50,000 soil health cards annually starting from 2011-12.
Additional labs, Static and mobile are planned to be	Under NPMSH&F, 2 new STLs at North Tripura and Dhalai Tripura districts are proposed to be set up along with a new

set up	MSTL at West Tripura district.
Strengthening existing soil testing laboratories for micronutrient testing	It is planned to strengthen the existing STLs to enable them to undertake soil micronutrient testing.
Staffing of laboratories	The actual staff in position is not indicated.
Preparation of Soil Fertility Maps	Soil fertility maps are being prepared.
Popularizing soil test based application of fertilizers including demonstration and publicity.	• Soil test based fertilizer use recommendation is popularized through field demonstrations/front line demonstrations organized in association with KVKs. Thrust is also given to soil management through crop rotation and balanced use of manures and fertilizers. • To facilitate soil testing advisory service, particularly in remote areas of the State, 54 soil testing kits along with 54 refill sets have been distributed to different agri. sectors. Soil testing kit is considered effective to give on the spot recommendations in remote areas.

Successes/Best Practices

1. Soils in Tripura State are acidic in nature and rice based cropping system is popular. Amendment of acid soil is a major concern of the State. In view of this, a programme of lime/basic slag use has been taken under NPMSH&F. 2. A programme of supply of zinc sulphate has been taken up since zinc deficiency is reported in many areas in the State.

Uttar Pradesh

Existing Status

Number of Soil Testing Laboratories set up in the State	There are 73 STLs – one in each district, except Meerut, Varanasi and Barabanki districts which have 2 STLs each. There are 182 additional STLs which are functioning at Sub Division/Tehsil level. In addition to these 255 STLs, there are 18 Mobile STLs at regional level. Fertilizer Industry has set up 46 STLs and 3 Mobile STLs have been set up by other organizations. In all, there are 322 labs in the State with an analyzing capacity of 40.04 lakh soil samples per annum. However, out of these labs, 182 labs are in the process of being set up and are expected to become functional during 2011-12.
Annual analyzing capacity	Analyzing capacity would be 40.04 lakh samples per year after the block level 182 Labs become functional.
Capacity Utilization	20.69 lakh samples are being analyzed presently.
Review of functioning	Functioning is reviewed on monthly basis.
Constraints	i) For micronutrient analysis, 40 AAS are required. ii) For Tehsil level laboratories, electricity is a problem. iii) Required manpower is 611, out of which 404 persons are working. Iv) For tehsil level laboratories 546 technical persons are required.
Monitoring	The lab at Alambagh, Lucknow is designated as a Nodal Lab. It has a capacity of analyzing 25,000 samples per year.
Number of Soil Health Cards issued	Year-wise number of cards issued is as follows: 14.48 lakh (upto 2007-08); 19.56 lakh (2008-09); 17.74 lakh (2009-10).
Preparation of soil fertility map	Since 2006-07, at the end of every year, fertility status is found out on the basis of Nutrient Index of soil samples and every three years, data are used for the preparation of digital map which provides the status of soil fertility at block level. Efforts are being made for putting the soil fertility maps on website of U.P. Agriculture Department (www.agriculture.up.nic.in).
Involvement of State	There are four SAUs in the State. The Extension Divisions

Agricultural University(s)	of all the Universities use the soil test data for recommendation of fertilizer use and they extensively propagate the same to the farmers. Under the ATMA program (Agriculture Technology Management Agency) every extension agency uses the soil test values for the recommendation or for correction of nutrient deficiencies. Universities are also helping to diagnose the deficiency symptoms of nutrients.

Action Plan

Issue soil health cards	The State Govt. is already issuing soil health cards to the farmers. Since 2007-08 State Govt. has issued 63.17 lac soil health cards.
Additional labs, Static and mobile are planned to be set up	255 STLs are planned, out of which 73 Static labs are working and remaining 182 Tehsil level labs will start functioning from 2010-11.
Strengthening existing soil testing laboratories for micronutrient testing	As per the plan, every district soil testing lab will be able to test the micronutrients. Out of 72 districts, 31 districts labs are having micronutrient analysis facilities. For the remaining, a plan is submitted under NPMSH&F.
Staffing of laboratories	It is reported that 404 persons are working in soil testing labs. For tehsil level labs, 546 persons are supplied by service providers. However, total required staff is indicated to be 753. Every year 10 trainings/ orientation programs are organized at Regional level.
Preparation of Soil Fertility Maps.	Soil fertility maps are being prepared/updated every three years.
Popularizing soil test based application of fertilizers including demonstration and publicity.	For popularization of soil test based fertilizer application, Department of Agriculture conducts field demonstrations at 9 Regional Stations and also organizes farmers' fair and seminars. A special flag ship program of State Govt. is "Apni mitti pehechane abhiyan" which is running from 2008-09. Under this, a special campaign is organized for collection of soil samples and in this program, all stakeholders participate.

Successes/Best Practices

The State Govt. is planning to set up 565 soil testing labs which will be in addition to 73 district labs in operation and 182 labs which are being set up. In their planning the State Govt. stipulates the establishment of block wise labs. It is stated that the soil samples

would be collected every year rather than with a gap of 3 years.

Uttarakhand

Existing Status

Number of Soil Testing Laboratories set up in the State	• There are 13 districts and 95 blocks in the State. State has 13 soil testing laboratories, one in each district. • Fertilizer consumption in the hill region is about 4 kg/ ha. while in the plains it is about 250 kg/ha. • There are 2 mobile laboratories; one each located in Tehri and Pithrogarh districts. • Micronutrient testing facilities are available in Pauri, Udhamsingh Nagar, Haridwar and Dehradoon districts labs. • Micronutrient testing facilities are proposed to be created in all the remaining 11 STLs.
Annual analyzing capacity	• Not indicated, but total number of soil health cards issued annually is 1,85,708. • There are 9,21,554 land holdings in the State.
Capacity Utilization	Not indicated.
Review of functioning	Functioning is reviewed by Joint Director Agriculture (QC).
Constraints	Not indicated.
Monitoring	The overall monitoring is done Joint Director Agriculture (QC) at the State level.
Number of Soil Health Cards issued	So far, 1,85,708 soil health cards have been distributed.
Preparation of soil fertility map	Not indicated.
Involvement of State Agricultural University(s)	Note indicated.

Action Plan

Issue soil health cards	During 12th Plan 7,35,846 soil health cards are

	proposed to be distributed in the State, with the annual target of issuing 1,47,169 soil health cards which will cover all the land holdings by the end of 12th Plan i.e. 2016-17.
Additional labs, Static and mobile are planned to be set up	The State has made a plan to create micronutrient testing facilities in Bageshwar, Champawat, Uttarkashi, Pithorgarh, Dehradoon, Tehri, Nainital, Almora & Rudraprayag under NPMSH&F.
Strengthening existing soil testing laboratories for micronutrient testing	The State Govt. is planning to strengthen remaining 9 STLs for micronutrient testing facilities.
Staffing of laboratories	• Two Assistant Director (Soil testing) are posted in each region for technical supervision & monitoring of soil testing programme. • Two/Three technical assistants are engaged for soil sample analysis with other supporting laboratories staff.
Preparation of Soil Fertility Maps	Not indicated.
Popularizing soil test based application of fertilizers including demonstration and publicity	Nothing is indicated.

West Bengal

Existing Status

Number of Soil Testing Laboratories	The total number of STLs in the State is 58. The break up is as follows: i) State Govt. owned STLs = 10; MSTLs = 8. ii) NGO and other Private Organizations = 34; MSTLs = 3 iii) 3 University Labs = 3 STLs.
Annual analyzing capacity	The total analyzing capacity of these labs is 1,97,000 soil samples per annum.
Capacity Utilization	50%.
Review of functioning	The functioning of labs is reviewed regularly.
Constraints	For filling up of vacant posts, proposal is under consideration of State Govt.
Monitoring	The laboratories at Tollgunge and Berhampore act as Nodal Laboratories in the State. They monitor the quality of work in STLs.
Number of Soil Health Cards issued	During 2009-10, 47,800 soil health cards were issued to the farmers.
Preparation of soil fertility map	Out of 18 districts, soil nutrient maps for 6 districts were released on 09.12.2009 and the rest are under process.
Involvement of State Agricultural University(s)	Experts from the State Agri. Universities are members of State Fertilizer Committee. They are involved in advising farmers on soil test based fertilizer use.

Action Plan

Issue soil health cards	Soil health cards are being issued.
Additional labs, Static and mobile are planned to be set up	Four addition MSTLs and one Static Lab will start functioning by 2011.
Strengthening existing soil testing laboratories for micronutrient testing	AAS will be provided to 2 State laboratories by 2011.

Staffing of laboratories	The proposal is under the consideration of State Govt. (Finance Department)
Preparation of Soil Fertility Maps	Preparation of the soil fertility maps for the remaining 12 districts is under process.
Popularizing soil test based application of fertilizers including demonstration and publicity	Large scale demonstration program has been taken up by different soil testing laboratories. These demonstrations are financed by the Nation Project on Management of Soil Health and Fertility.

Annex 1

About Soil Health

- Organic carbon, organic matter and microbial biomass are direct indicator of soil biological status of soil health.
- Soil health can be summed up to state that it is the capacity of a soil to function within ecosystem boundaries to sustain biological productivity, maintain environmental quality and promote plant and animal health.
- In the context of agriculture, it may refer to its ability to sustain agricultural productivity.
- A healthy soil would ensure proper retention and release of water and nutrient, promote and sustain root growth, maintain soil biotic habitat, respond to management and resist degradation.
- Soil health is governed by a number of physical, chemical and biological attributes and processes.
- It is expressed by different quantitative and qualitative measures of these attributes as also by outcomes that are governed by the soil such as productivity, nutrient and water use efficiencies and quality of produce.

Annex 2

N, P and K fertility status of different districts in the states as determined by IISS, Bhopal

Andhra Pradesh

Nutrient	Status	Districts
N	Low	Adilabad, Chittoor, Cuddapah, East Godavari, Guntur, Karimnagar, Khammam, Krishna, Kurnool, Mahbubnagar, Nizamabad, Visakhapatnam, Vizianagaram, Warangal, West Godavari
	Medium	Anantapur, Hyderabad, Medak, Nalgonda, Nellore, Prakasam, Rangareddi, Srikakulam
	High	-
P	Low	Adilabad, Anantapur, Chittoor, Cuddapah, Guntur, Hyderabad, Karimnagar, Khammam, Krishna, Kurnool, Mahbubnagar, Medak, Nalgonda, Nellore, Nizamabad, Rangareddi, Srikakulam, Warangal
	Medium	East Godavari, Prakasam, Visakhapatnam, Vizianagaram, West Godavari
	High	-
K	Low	-
	Medium	East Godavari, Nizamabad, Rangareddi
	High	Adilabad, Anantapur, Chittoor, Cuddapah, Guntur, Hyderabad, Karimnagar, Khammam, Krishna, Kurnool, Mahbubnagar, Medak, Nalgonda, Nellore, Prakasam, Srikakulam, Visakhapatnam, Vizianagaram, Warangal, West Godavari

Assam

Nutrient	Status	Districts
N	Low	Bongaigaon, Bopeta, Chirang, Darrang, Kokrajhar, Morigaon, N C Hills, Nalbari
	Medium	Cachar, Dhemaji, Dhubri, Dibrugarh, Goalpara, Golaghat, Hailakandi, Jorhat, Kamrup, Karbi angling, Karimganj, Lakhimpur, Nagaon, Sivsagar, Sonitpur, Tinsukia, Udalguri
	High	-
P	Low	Jorhat, Karbi angling, Udalguri
	Medium	Bongaigaon, Borpeta, Cachar, Chirang, Darrang, Dhemaji, Dhubri, Dibrugarh, Goalpara, Golaghat, Hailakandi, Kamrup, Karimganj, Kokrajhar, Lakhimpur, Morigaon, N C Hills, Nagaon, Nalbari, Sivsagar, Sonitpur, Tinsukia
	High	-
	Low	Bongaigaon, Cachar, Chirang, Golaghat, Hailakandi, Jorhat, Karimganj,

K		Kokrajhar, N C Hills, Nagaon, Sivsagar, Udalguri
	Medium	Bofpeta, Darrang, Dhemaji, Dhubri, Goalpara, Kamrup, Lakhimpur, Morigaon, Nalbari, Sonipat, Tinsukia
	High	Dibrugarh, Karbi angling

Bihar

Nutrient	Status	Districts
N	Low	Aurangabad, Bhagalpur, Baka, Sekhpur, Jamui, Lakhisarai, Darbhanga, Gaya, Gopalganj, Jahanabad, Arbal, Madhepura, Munger, Saharsha, Sapual
	Medium	Baksar, Bhabhua Rohatash, Begusarai, Bhojpur, East Champaran, Katihar, Khagaria, Kisangang, Madhubani, Muzaffarpur, Nalanda, Nawadah, Patna, Purnia, Samastipur, Sharan, Shivhar, Sitarmarhi, Sivan, Vaisale
	High	West Champaran
P	Low	Gaya, Jahanabad, Arbal, Katihar, Kisangang, Madhepura, Purnia, Saharsha, Sapual, Sharan, Sivan
	Medium	Aurangabad, Baksar, Bhabhua Rohatash, Begusarai, Bhagalpur, Baka, Sekhpura, Jamui, Lakhisarai, Bhojpur, Darbhanga, East Champaran, Gopalganj, Khagaria, Madhubani, Munger, Muzaffarpur, Nalanda, Nawadah, Patna, Shivhar, Sitarmarhi, Vaisale, West Champaran
	High	Samastipur
K	Low	Gaya, Jahanabad, Arbal, Madhepura, Madhubani, Muzaffarpur, Saharsha, Sapual, Vaisale
	Medium	Baksar, Bhabhua Rohatash, Begusarai, Bhagalpur, Baka, Sekhpura, Jamui, Lakhisarai, Bhojpur, Darbhanga, East Champaran, Gopalganj, Katihar, Khagaria, Kisangang, Munger, Nalanda, Nawadah, Patna, Purnia, Samastipur, Sharan, Shivhar, Sitarmarhi, Sivan, West Champaran
	High	Aurangabad

Chhattisgarh

Nutrient	Status	Districts
N	Low	Bastar, Dantewara, Dhamtari, Durg, Kanker, Kawardha, Mahasmund, Raipur, Rajnandgaon
	Medium	Baikunthapur, Bilaspur, Janigir, Jashpur, Korba, Koriya, Rajgarh, Sarguja
	High	-
P	Low	Bastar, Dantewara, Dhamtari, Kanker, Korba, Mahasmund, Raipur
	Medium	Baikunthapur, Bilaspur, Durg, Janigir, Jashpur, Kawardha, Koriya, Rajgarh, Rajnandgaon, Sarguja
	High	-

K	Low	Bastar, Dantewara, Kanker
	Medium	Dhamtari, Mahasmund, Raipur, Rajnandgaon
	High	Baikhunthapur, Bilaspur, Durg, Janigir, Jashpur, Kawardha, Korba, Koriya, Rajgarh, Sarguja

Gujarat

Nutrient	Status	Districts
N	Low	Amreli, Banaskantha, Bharuch, Gandhinagar, Jamnagar, Kutch, Mahesana, Narmada, Patan, Sabarkantha, Surat, Surendranagar, Vadodara
	Medium	Anand, Bhawnagar, Dahod, Dang, Kheda, Navsari, Panchmahal, Valsad
	High	Junagadh, Porbandar, Rajkot
P	Low	Banaskantha, Bharuch, Bhawnagar, Dahod, Mahesana, Narmada, Navsari, Panchmahal, Patan, Porbandar, Surendranagar, Valsad
	Medium	Amreli, Anand, Dand, Gandhinagar, Jamnagar, Jungadh, Kutch, Kheda, Rajkot, Sabarkantha, Surat, Vadodara
	High	-
K	Low	-
	Medium	Banaskantha, Kutch, Sabarkantha, Vadodara
	High	Amreli, Anand, Bharuch, Bhawnagar, Dahod, Dang, Gandhinagar, Jamnagar, Junagadh, Kheda, Mahesana, Narmada, Navsari, Panchmahal, Patan, Porbandar, Rajkot, Surat, Surendranagar, Valsad

Haryana

Nutrient	Status	Districts
N	Low	Bhiwani, Faridabad, Fatehbad, Gurgaon, Hisar, Jhajjar, Jind, Kaithal, Karnal, Kurukshetra, Mahendragarh, Panchkula, Panipat, Rewari, Sirsa, Sonipat, Yamuna Nagar
	Medium	Rohtak
	High	-
P	Low	Bhiwani, Faridabad, Fatehbad, Gurgoan, Hisar, Jhajjar, Jind, Kaithal, Karnal, Kurukshetra, Panchkula, Panipat, Rewari, Sirsa, Sonipat, Yamuna Nagar
	Medium	Mahendragarh, Rohtak
	High	-
K	Low	-
	Medium	Faridabad, Gurgaon, Hisar, Karnal, Panchkula, Rohtak, Rewari, Yamun Nagar
	High	Bhiwani, Fatehbad, Jhajjar, Jind, Kaithal, Kurukshetra, Mahendragarh, Panipat, Sirsa, Sonipat

Himachal Pradesh

Nutrient	Status	Districts
N	Low	-
	Medium	Hamirpur, Kangra, Mandi, Una
	High	Chamba, Kinnaur, Kulu, Lahaul spiti, Simla, Sirmour, Solan
P	Low	Hamirpur, Kangra, Mandi, Simla, Una
	Medium	Chamba, Kulu, Lahaul spiti, Sirmour, Solan
	High	Kinnaur
K	Low	Chamba, Hamirpur, Kangra, Kinnaur, Lahaul spiti, Una
	Medium	Kulu, Mandi, Simla, Sirmour, Solan
	High	-

Karnataka

Nutrient	Status	Districts
N	Low	Kolar
	Medium	Bangalore (R), Bangalore (U), Bellari, Bidar, Bijapura, Chitradurga, Davanagere, Gulbura, Hassan, Mysore, Raichur, Shimoga, Tumkur
	High	Belagaum, Chamrajnagar, Chikkamagalore, Coorg, Dharwad, Gadag, Haveri, Kadogri, Mandya, North Kannada, Sough Kannada, Udupi
P	Low	Bellari, Bijapur, Hassan, Norht Kannada, South Kannada, Udupi
	Medium	Bangalore (U), Belagaum, Bidar, Chikkamagalore, Chitradurga, Coorg, Dharwad, Gadag, Gulburga, Haveri, Kodagi, Kolar, Mysore, Raichur, Shimoga, Tumkur
	High	Bangalore (R), Chamrajnagar, Davanagere, Mandya
K	Low	South Kannada, Udupi
	Medium	Chikkamagalore, Kolar, Mandya, North Kannada, Shimoga
	High	Bangalore (R), Bangalore (U), Belagaum, Bellari, Bidar, Bijapura, Chamrajnagar, Chitradurga, Coorg, Davanagere, Dharwad, Gadag, Gulburga, Hassan, Haveri, Kodagi, Mysore, Raichur, Tumkur

Kerala

Nutrient	Status	Districts
N	Low	Kasaragod, Kollam, Thiruvananthapuram
	Medium	Ernakulam, Idukki, Kannur, Kottayam, Kozhikkode, Malappuram, Palakkad, Pathanamthitta, Thrissur
	High	Wyanadu
P	Low	-
	Medium	Idukki, Kannur, Kasaragod, Kozhikkode, Malappuram, Palakkad,

		Pathanamthitta, Thrissur, Wyandu
	High	Ernakulam, Kollam, Kottayam, Thiruvananthapuram
K	Low	-
	Medium	Idukki, Kannur, Kasaragod, Kollam, Kottayam, Kozhikkode, Malappuram, Pathanamthitta, Thiruvananthapuram, Thrissur, Wyanadu
	High	Ernakulam, Palakkad

Madhya Pradesh

Nutrient	Status	Districts
N	Low	Bhind, Chhattarpur, Daria, Gwalior, Indore, Jabalpur, Mandsaur, Neemuch, Morena, Panna, Ratlam, Sheopu, Shivpuri, Sidhi
	Medium	Annupur, Bagwai, Balaghat, Betul, Bhopal, Bodwani, Burhanpur, Chhindwara, Damoh, Dewas, Dindori, Harda, Jhabua, Katni, Khandwa, Mandla, Narsinghpur, Raisen, Rewa, Sagar, Satna, Seoni, Shahdol, Shajapur, Tikmgarh, Ujjain, Umaria, Vidisha
	High	Ashok Nagar, Guna, Hoshangabad, Rajgarh, Sehore
P	Low	Ashok Nagar, Betul, Bhind, Chhattarpur, Damoh, Daria, Dewas, Gwalior, Japlpur, Jhabua, Katni, Panna, Shivpuri, Ujjain, Umaria
	Medium	Anuppur, Bagwai, Balaghat, Bhopal, Bodwani, Burhanpur, Chhindwara, Harda, Indore, Khandwa, Khargone, Mandla, Mandsaur, Neemuch, Morena, Narsinghpur, Raisen, Ratlam, Rewa, Sagar, Satna, Seoni, Shahdol, Shajapur, Sheopu, Sidhi, Tikmgarh, Vidisha
	High	Dindori, Guna, Hoshangabad, Rajgarh, Sehore
K	Low	Dhar, Anuppur, Betul, Gwalior, Morena, Sagar, Sidhi
	Medium	Ashok Nagar, Balaghat, Damoh, Daria, Dindori, Guna, Harda, Japlpur, Katni, Mandla, Rewa, Satna, Shivpuri, Tikmgarh, Umaria
	High	Bagwai, Bhind, Bhopal, Badwani, Burhanpur, Chhattarpur, Chhindwara, Dewas, Hoshangabad, Indore, Jhabua, Khandwa, Khargone, Mandsaur, Neemuch, Narsinghpur, Panna, Raisen, Rajgarh, Ratlam, Sehore, Seoni, Shahdol, Shajapur, Sheopu, Ujjain, Vidhisha

Maharashtra

Nutrient	Status	Districts
N	Low	Akola, Amaravati, Aurangabad, Beed, Bhandara, Buldhana, Gondiya, Hingoli, Jalgaon, Jalna, Latur, Nagpur, Nanded, Nashik, Parbhani, Pune, Raigad, Ratnagiri, Sangali, Satara, Solapur, Usmanabad, Wardha, Washim, Yeotmal
	Medium	Dhule, Kolhapur, Nandurbar, Sindhudurg, Thane

	High	-
P	Low	Akola, Amaravati, Aurangabad, Bhandara, Bhuldhana, Dhule, Gondiya, Hingoli, Jalgaon, Jalna, Kolhapur, Latur, Nagpur, Nanded, Nandurbar, Nashik, Parbhani, Pune, Raigad, Ratnagiri, Sangali, Satara, Sindhudurg, Solapur, Usmanabad, Wardha, Washim, Yeotmal
	Medium	Beed, Thane
	High	-
K	Low	Raigad, Sindhudurg
	Medium	Kolhapur, Nashikm Sangali, Satara, Thane
	High	Akola, Amaravati, Aurangabad, Beed, Bhandara, Buldhana, Dhule, Gondiya, Hingoli, Jalgaon, Jalna, Latur, Nagpur, Nanded, Nandurbar, Parbhani, Pune, Ratnagiri, Solapur, Usmanabad, Wardha, Washim, Yeotmal

Orissa

Nutrient	Status	Districts
N	Low	Bhadrak, Boudh, Cuttuck, Dhenkanal, Gajapati, Ganjam, Jagatsinghpur, Kalahandi, Kendrapada, Khurda, Mayurbhanj, Naupada, Nayagarh, Bhulbani, Puri, Sundargarh
	Medium	Balasore, Bargarh, Bolangir, Deogarh, Jharsuguda, Keonjhar, Koraput, Malkangiri, Nawrangpur, Rayagada, Sambalpur, Sonepur
	High	-
P	Low	Balasore, Bhadrak, Cuttack, Gajapati, Ganjam, Jharsuguda, Keonjhar, Mayurbhanj, Nawrangpur, Phulbani, Sambalpur
	Medium	Bargarh, Bolangir, Boudh, Deogarh, Dhenkanal, Jagatsighpur, Kalahandi, Kendrapada, Khurda, Koraput, Malkangiri, Naupada, Nayagarh, Puri, Sonepur, Sundargarh
	High	-
K	Low	Cuttack, Ganjam, Nayagarh
	Medium	Balasore, Bargarh, Bhadrak, Deogarh, Dhenkanal, Gajapati, Jagatsinghpur, Jharsuguda, Kalahandi, Kendrapada, Khurda, Koraput, Malkangiri, Naupada, Nayagarh, Puri, Sundragarh
	High	Bolangir, Boudh, Keonjhar, Mayurbhanj, Phulbani, Sambalpur, Sonepur

Punjab

Nutrient	Status	Districts
N	Low	Bhatinda, Faridkot, Ferozepur, Gurdaspur, Hoshiarpur, Jalandhar, Kapurthala, Ludhiana, Mansa, Moga, Muktsar
	Medium	Fategar Sahib, Nawashahar, Patiala, Ropar, Sangrur
	High	-

P	Low	-
	Medium	Faridkot, Ferozepur, Mansa, Mogar, Miktasar, Nawashahar, Patiala, Sangrur
	High	Bhatinda, Fategar Sahib, Gurdaspur, Hoshiarpur, Jalandhar, Kapurthala, Ludhiana, Ropar
K	Low	-
	Medium	Hoshiarpur, Ropar
	High	Bhatinda, Faridkot, Fategar Sahib, Ferozepur, Gurdaspur, Jalandhar, Kapurthala, Ludhiana, Mansa, Moga, Muktasar, Nawashahar, Patiala, Sangrur

Rajasthan

Nutrient	**Status**	**Districts**
N	Low	Alwar, Banswara, Baran, Bharatpur, Barmer, Bundi, Churu, Dausa, Dholpur, Durgapur, Hanumangarh, Jaisalmer, Jalore, Jhunjhun, Jodhpur, Karauli, Kota, Nagpur, Pali, Rajsamand, Sawai Madhopur, Sikar, Sirhi, Sriganganagar, Tonk
	Medium	Bhilwara, Chittorgarh, Jhalawar, Udaipur
	High	-
P	Low	Bharatpur, Barmer, Churu, Dausa, Dholpur, Durgapur, Hanumangarh, Jaisalmer, Jalore, Karauli, Sawai Madhopur, Sikar, Sirohi, Sirhi, Sriganganagar
	Medium	Alwar, Banswara, Baran, Bhilwara, Bundi, Chittorgarh, Jhalawar, Jodhpur, Kota, Nagpur, Pali, Rajsamand, Tonk, Udaipur
	High	-
K	Low	-
	Medium	Banswara, Bharatpur, Bhilwara, Bundi, Dholpur, Rajsamand
	High	Alwar, Baran, Barmer, Chittorgarh, Churu, Dausa, Durgapur, Hanumangarh, Jaisalmer, Jalore, Jhalawar, Jhunjhun, Jodhpur, Karauli, Kota, Nagpur, Pali, Sawai Madhopur, Sikar, Sirohi, Sirhi, Sriganganagar, Tonk, Udaipur

Tamil Nadu

Nutrient	**Status**	**Districts**
N	Low	Coimbatore, Cuddalore, Dharmapuri, Dindigul, Erode, Fudukkottai, Kanchipuram, Kanyakumari, Karur, Madurai, Nagapattinam, Namakkal, Peerambalur, Ramanathapuram, Salem, Sivagangai, Thanjavur, Theni, Thiruallur, Thiruvarur, Thoothukudi, Tiruvannamalai, Tiruvarur, Trichiraplli, Vellore, Villupuram, Virudhunagar
	Medium	Salem
	High	Nilgiri

P	Low	Kanchipuram, Sivagangai, Thoothukudi, Trichirapalli
	Medium	Cuddalore, Dharmapuri, Dindigul, Erode, Kanyakumari, Karur, Namakkal, Salem, Theni, Villupuram, Virudhunagar
	High	Coimbatore, Fudukkottai, Madurai, Nagapattinam, Nilgiri, Peerambalur, Ramanathapuram, Thanjavur, Thiruallur, Thiruvarur, Tiruvannamalai, Tiruvarur, Vellore
K	Low	Ariyalur
	Medium	Cuddalore, Erode, Kanchipuram, Kanyakumari, Karur, Namakkal, Thiruallar, Villupuram
	High	Coimbatore, Dharmapuri, Dindigul, Fudukkottai, Madurai, Nagapattinam, Nilgiri, Peerambalur, Ramananthpuram, Salem, Sivagangai, Thanjavur, Theni, Thiruvarur, Thoothukudi, Tiruvnnamalai, Tiruvarur, Trichirapalli, Vellore, Virudhunagar

Uttar Pradesh

Nutrient	Status	Districts
N	Low	Aazamgarh, Agra, Aligarh, Allahabad, Ambedkarnagar, Auraiya, Badanyu, Baghpat, Baharaich, Baliya, Balrampur, Banda, Barabanki, Bareli, Basti, Bijnaur, Buland Shahar, Chandouli, Chitrkut, Devariya, Eta, Etahwa, Faizabad, Farukkhabad, Fatehabad, Firozabad, Gautambudh nagar, Gazipur, Ghaziabad, Gorakhapur, Hameerpur, Hardoi, Hathras, Jalaun, Jaunpur, Jhansi, Jyotishaphool nagar, Kannauj, Kanpur Dehat, Kanpur Nagar, Kashiram Nagar, Kaushambee, Kushinagar, Lalitpur, Lucknow, Lukhimpur, Maharajganj, Mahowa, Mainpuri, Mathura, Mau, Meerut, Muradabad, Muzzafar Nagar, Peelibhit, Pratapgarh, Rampur, Raybareli, Saharanpur, Santkabeer Nagar, Shahjahapur, Sidhrth Nagar, Sitapur, Sonebhadra, Sribasti, Sultanpur, Unnav, Varanasi.
	Medium	Mirzapur, Santravidasnagar
	High	-
P	Low	Aazamgarh, Agra, Aligarh, Allahabad, Ambedkarnagar, Auraiya, Badanyu, Baghpat, Baharaich, Baliya, Balrampur, Banda, Barabanki, Bareli, Basti, Bijnour, Buland Shahar, Chandouli, Chitrakut, Devariya, Eta, Etawa, Faizabad, Farukhabad, Fatehabad, Firozabad, Gautambudh nagar, Gazipur, Ghaziabad, Gorakhpur, Hameerpur, Hathras, Jalaun, Jaunpur, Jhansi, Jyotishaphool nagar, Kannauj, Kanpur Dehat, Kanpur Nagar, Kashiram Nagar, Kaushambee, Kushinagar, Lalitpur, Lucknow, Lukhimpur, Maharajganj, Mahowa, Mainpuri, Mathura, Mau, Meerut, Mirzapur, Muradabad, Muzzafarnagar, Peelibhit, Pratapgarh, Rampur, Raybareli, Saharanpur, Santkabeer nagar, Santravidasnagar, Shahjahapur, Sidhrath Nagar, Sitapur, Sonebhadra, Sribasti, Sultanpur, Unnav, Varanasi
	Medium	Hardoi

	High	-
K	Low	-
	Medium	Aazamgarh, Amedkarnagar, Auraiya, Baghpat, Bahraich, Baliya, Balrampur, Banda, Barabanki, Bareli, Basti, Bijnaur, Chandouli, Chitrakut, Devariya, Etawa, Faizabad, Farukkhabad, Gautambudh nagar, Gazipur, Gorakhpur, Jyotishaphool nagar, Kannauj, Kanpur Dehat, Kanpur Nagar, Kushinagar, Lukhimpur, Maharajganj, Mahowa, Mathura, Mau, Meerut, Muradabad, Muzzafar nagar, Peelibhit, Pratapgarh, Rampur, Saharanpur, Santkabeer nagar, Shahjahapur, Sidhrath nagar, Sitapur, Sribasti, Sultanpur, Varanasi
	High	Agra, Aligarh, Allahabad, Badanyu, Buland Shahar, Eta, Fatehabad, Firozabad, Ghaziabad, Hameerpur, Hardoi, Hthras, Jalaun, Jaunpur, Jhansi, Kashiram nagar, Kaushambee, Lalitpur, Lucknow, Mainpur, Mirzapur, Raybareli, Santravidasnagar, Sonebhadra, Unnav

Uttarakhand

Nutrient	Status	Districts
N	Low	Dehradun, Tehari Gadwal, Udhamsingh Nagar, Uttarkashi
	Medium	Chamoli, Champawat, Haridwar, Nainital, Paudi, Rudraprayag
	High	Bageswar, Pithoragad
P	Low	Bageswar, Chamoli, Champawat, Dehradun, Haridwar, Paudi, Rudraprayag, Udhamsingh Nagar, Uttarkashi
	Medium	Nainital, Pithoragad, Tehari Gadwal
	High	-
K	Low	-
	Medium	Dehradun, Haridwar, Paudi, Pithoragad, Rudraprayag, Tehari Gadwal, Udhamsingh Nagar, Uttarkashi
	High	Bageswar, Chamoli, Champawat, Nainital

West Bengal

Nutrient	Status	Districts
N	Low	Midnapore E, Midnapore W, North 24- Parganas, South 24- Parganas
	Medium	Darjeeling, Hooghly, Jalpaiguri, Nadia, Prakama, Purulia
	High	-
P	Low	Midanpore E, Prakama, Purulia
	Medium	Darjeeling, Jalpaiguri, Midanpore W, Nadia, North 24- Parganas, South 24- Parganas
	High	Hooghly
K	Low	Jalpaiguri
	Medium	Darjeeling, Hooghly, Midnapore E, Midnapore W, Nadia, North 24-Parganas, Prakama, Purulia, South 24-Parganas
	High	-

Annex 3

NPK Consumption Ratio during the year 2007-08, 2008-09, 2009-10 and 2010-11

State	2007-08			2008-09			2009-10			2010-11(P)		
	N	P	K	N	P	K	N	P	K	N	P	K
Andhra Pradesh	3.8 : 1.7 : 1			3.5 : 1.7 : 1			3.6 : 1.8 : 1			3.9 : 2.1 : 1		
Karnataka	2.4 : 1.2 : 1			2.1 : 1.4 : 1			2.1 : 1.4 : 1			2.6 : 1.7 : 1		
Kerala	1.3 : 0.6 : 1			1.2 : 0.6 : 1			1.2 : 0.6 : 1			1.2 : 0.7 : 1		
Tamil Nadu	1.8 : 0.7 : 1			1.8 : 0.7 : 1			1.9 : 0.8 : 1			2.1 : 0.9 : 1		
Pondicherry	2.3 : 1.0 : 1			2.6 : 0.9 : 1			3.1 : 0.8 : 1			3.5 : 0.9 : 1		
A&N Islands				2.0 : 1.3 : 1			2.4 : 2.1 : 1			2.1 : 1.7 : 1		
South Zone				**2.5 : 1.3 : 1**			**2.5 : 1.3 : 1**			**2.9 : 1.6 : 1**		
Gujarat	7.2 : 2.9 : 1			5.8 : 2.5 : 1			5.3 : 2.4 : 1			6.9 : 2.9 : 1		
Madhya Pr	10.5 : 5.7 : 1			8.9 : 5.9 : 1			8.3 : 5.3 : 1			7.8 : 5.8 : 1		
Chattisgarh	5.2 : 2.2 : 1			4.4 : 2.2 : 1			5.4 : 2.8 : 1			4.2 : 2.3 : 1		
Maharashtra	3.0 : 1.5 : 1			2.8 : 1.6 : 1			2.6 : 1.8 : 1			3.4 : 2.3 : 1		
Rajasthan	33.7 : 12.5 : 1			30.2 : 13.6 : 1			20.8 : 9.1 : 1			24.6 : 11.3 : 1		
Goa	1.9 : 1.0 : 1			1.4 : 1.3 : 1			1.2 : 1.2 : 1			1.9 : 1.2 : 1		
D&N Haveli				12.2 : 8.8 : 1			18.0 : 11.3 : 1			14.8 : 10.8 : 1		
West Zone				**5.0 : 2.6 : 1**			**4.6 : 2.6 : 1**			**5.6 : 3.3 : 1**		
Haryana	39.8 : 10.9 : 1			32.2 : 10.7 : 1			15.9 : 5.5 : 1			20.4 : 6.0 : 1		
Punjab	34.3 : 9.0 : 1			23.6 : 6.7 : 1			18.4 : 5.9 : 1			19.1 : 5.4 : 1		
Uttar Pradesh	15.1 : 4.5 : 1			11.5 : 3.6 : 1			9.0 : 3.2 : 1			11.8 : 4.0 : 1		
Uttaranchal	11.2 : 2.4 : 1			8.8 : 2.4 : 1			11.2 : 2.9 : 1			8.2 : 2.2 : 1		
Himachal Pr.	3.7 : 1.0 : 1			3.2 : 1.0 : 1			2.8 : 1.0 : 1			2.8 : 0.9 : 1		
J & K	11.9 : 3.6 : 1			8.1 : 3.3 : 1			5.7 : 1.9 : 1			6.5 : 3.3 : 1		
Delhi										2.7 : 1.0 : 1		
North Zone				**14.6 : 4.5 : 1**			**11.1 : 3.8 : 1**			**13.5 : 4.3 : 1**		
Arunachal Pr.				5.7 : 2.3 : 1			5.7 : 2.4 : 1			5.8 : 2.4 : 1		
Bihar	11.0 : 2.3 : 1			5.7 : 1.5 : 1			5.3 : 1.5 : 1			5.8 : 1.9 : 1		
Jharkhand	9.2 : 4.7 : 1			7.0 : 3.6 : 1			4.8 : 2.8 : 1			8.8 : 4.2 : 1		
Orissa	4.3 : 1.9 : 1			3.3 : 1.7 : 1			3.7 : 1.9 : 1			3.3 : 1.7 : 1		
W.B	2.2 : 1.3 : 1			1.7 : 1.0 : 1			1.6 : 1.0 : 1			1.9 : 1.3 : 1		
Assam	1.8 : 1.0 : 1			2.0 : 0.8 : 1			1.9 : 0.7 : 1			1.9 : 0.8 : 1		
Tripura	3.4 : 1.2 : 1			2.7 : 1.3 : 1			2.6 : 1.0 : 1			3.2 : 1.3 : 1		
Manipur	11.0 : 2.6 : 1			6.4 : 1.3 : 1			29.6 : 2.8 : 1			13.7 : 2.7 : 1		
Meghalaya	7.7 : 3.7 : 1			6.5 : 1.7 : 1			7.1 : 2.4 : 1			6.3 : 3.2 : 1		
Mizoram				2.0 : 1.1 : 1			1.9 : 2.3 : 1			1.8 : 2.2 : 1		
Nagaland	3.9	2.1	1	3.9	2.7	1	2.9	1.9	1	4.6 : 3.0 : 1		
East Zone				**2.9 : 1.2 : 1**			**2.8 : 1.2 : 1**			**3.0 : 1.5 : 1**		
ALL INDIA	**5.5 : 2.1 : 1**			**4.6 : 2.0 : 1**			**4.3 : 2.0 : 1**			**5.0 : 2.4 : 1**		

Annex 4

Strategies to address Soil Health

- Use of organic manures and recycling of biomass need to be promoted.
- Encourage mixed/intercrops of pulses in all major cropping systems.
- Encourage N-fixing and other useful trees/bushes as hedges on bunds for in-situ production of biomass. Wherever possible, green manure crops be promoted.
- Chemical nutrients may be used only on soil test based recommendations.
- Encourage use of mineral nutrient resources such as rock phosphate along with composts (Phosphate rich organic manure-PROM).
- Encourage integration of cattle in farming system mode.
- Use of lime, gypsum, basic slag and other soil amendments in problem soils be used so that Soil pH is brought to near neutrality to improve nutrient up take and fertilizer use efficiency.
- Biofertilisers need to be promoted on massive scale similar to chemical fertilizers but at the same time it needs to be ensured that biofertilisers of standard quality are supplied to the farmers so that they remain active till their use/ application.
- It is generally agreed that combined application of both nitrogenous and phosphatic biofertilizers can supply 25 kg N and 10 kg P_2O_5 per hectare. Some of the important reasons for limited use of biofertilizers are:
  - Farmers are un-aware about biofertilizers.
  - Inconsistent results on their use.
  - Timely non-availability of standard quality biofertilizers which can withstand high temperatures.
  - Supply of spurious products in the market.
  - Dealers are not keen to store and supply biofertilizers to the farmers.
  - Based on a scientific soil test balanced and judicious use of chemical fertilizers (N,P,K) with secondary nutrient (Sulphur, Calcium, Magnesium) and micro nutrient (zinc, iron, copper, boron, molybdenum, manganese), in conjunction with organic sources of nutrients like green manures, organic manures (compost), vermi-compost etc. and bio-fertilizers.

Annex 5

Strategies to promote organic manures

- Continuing the promotion of organic manures including vermi composting.
- Encourage farmers for crop residue management through mulching/ recycling.
- Encourage for cattle as a integrated part of farming
- Encourage for dung and urine for composting
- Encourage ITKs preparation based on dung-urine for nutrient supply.
- Encourage alternative sources of fuel to save dung and biomass from being burnt or use as fuel
- All cities and towns with adequate solid waste may be supported by segregation of waste at source and use the biodegradable waste for setting up of mechanized compost plants. Compost so generated, may be distributed along with fertilizers on subsidy through public sector fertilizer companies.
- Fertilizer companies may adopt few cities for conversion of solid waste into compost and setting up of compost facility.
- All industries generating biological waste should be supported for conversion of biomass into compost. Such compost can also be sold to farmers at subsidized prices through public sector fertilizer companies.
- Sewage waste is not being utilized. Technologies have been developed by Bhabha Atomic Research Centre (BARC) for their sterilization and conversion into compost. Municipalities be roped into compulsorily set up such units.
- Panchayats may be encouraged for setting up of community biogas plants and community composting units under the supervision of block development officers.
- Community toilets can also be promoted and linked to such facilities for conversion of human waste into compost.
- Farmers need to be encouraged to take at least one green manuring crop once in 2 years for incorporation in the cropping system.
- Quality seed for green manure crops needs to make available in time to the farmers.
- Mechanical devices for green manure crop incorporation to be developed and promoted.
- Use of Biofertilizers needs to be promoted with the improved system of timely distribution.

Annex 6

Per-hectare Consumption of fertilizers *(State-wise, Nutrient-wise)* during 2010-11

S.N	State/U.T.	Consumption (in '000 tonnes)				Gross Cropped Area - 2008-09 Provisional ('000 ha)	Per hectare Fertiliser consumption in Kgs.*			
		N	P	K	TOTAL		N	P	K	TOTAL
1	Andhra Pradesh	1966.63	1031.98	498.18	3496.79	13830.00	142.20	74.62	36.02	252.84
2	Karnataka	1016.21	696.17	398.05	2110.43	12368.00	82.16	56.29	32.18	170.64
3	Kerala	117.68	69.00	96.86	283.54	2695.00	43.67	25.60	35.94	105.21
4	Tamil Nadu	643.18	279.91	306.10	1229.19	5824.00	110.44	48.06	52.56	211.06
5	puducherry	19.14	4.81	5.43	29.38	33.00	580.00	145.76	164.55	890.30
6	A&N Islands	0.39	0.33	0.19	0.91	18.00	21.67	18.33	10.56	50.56
7	Lakshadweep	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00
	SZ TOTAL	**3763.23**	**2082.20**	**1304.81**	**7150.24**	**34771.00**	**108.23**	**59.88**	**37.53**	**205.64**
8	Gujarat	1241.22	518.00	179.94	1939.16	11571.00	107.27	44.77	15.55	167.59
9	Madhya Pradesh	998.30	741.11	128.33	1867.74	20657.00	48.33	35.88	6.21	90.42
10	Chhattisgarh	321.99	171.19	68.99	562.17	5683.00	56.66	30.12	12.14	98.92
11	Maharashtra	1657.29	1126.37	671.68	3455.34	22108.00	74.96	50.95	30.38	156.29
12	Rajasthan	870.39	413.30	34.95	1318.64	22771.00	38.22	18.15	1.53	57.91
13	Goa	3.32	2.27	1.79	7.38	166.00	20.00	13.67	10.78	44.46
14	Daman & Diu	0.42	0.16	0.03	0.61	5.00	84.00	32.00	6.00	122.00
15	D&N Haveli	0.72	0.53	0.03	1.28	27.00	26.67	19.63	1.11	47.41
	WZ TOTAL	**5093.65**	**2972.93**	**1085.74**	**9152.32**	**82988.00**	**61.38**	**35.82**	**13.08**	**110.28**
16	Haryana	974.04	335.95	47.63	1357.62	6484.00	150.22	51.81	7.35	209.38
17	Punjab	1402.91	435.17	73.43	1911.51	7912.00	177.31	55.00	9.28	241.60
18	Uttar Pradesh	2951.01	1097.49	267.39	4315.89	25540.00	115.54	42.97	10.47	168.99
19	Uttarakhand	111.92	30.91	14.03	156.86	1188.00	94.21	26.02	11.81	132.04
20	Himachal Pr.	32.59	10.73	11.81	55.13	936.00	34.82	11.46	12.62	58.90
21	J & K	72.82	37.30	11.15	121.27	1137.00	64.05	32.81	9.81	106.66

22	Delhi	0.37	0.05	0.00	0.42	43.00	8.60	1.16	0.00	9.77
23	Chandigarh	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	
	NZ TOTAL	**5545.66**	**1947.60**	**425.44**	**7918.70**	**43242.00**	**128.25**	**45.04**	**9.84**	**183.13**
24	Bihar	907.28	289.59	155.84	1352.71	7797.00	116.36	37.14	19.99	173.49
25	Jharkhand	79.08	38.11	9.01	126.20	1689.00	46.82	22.56	5.33	74.72
26	Orissa	294.72	153.97	89.15	537.84	9071.00	32.49	16.97	9.83	59.29
27	West Bengal	712.37	495.58	363.87	1571.82	9802.00	72.68	50.56	37.12	160.36
	EZ TOTAL	**1993.45**	**977.25**	**617.87**	**3588.57**	**28359.00**	**70.29**	**34.46**	**21.79**	**126.54**
28	Assam	142.76	59.51	74.79	277.06	3984.00	35.83	14.94	18.77	69.54
29	Tripura	8.01	4.47	3.46	15.94	295.00	27.15	15.15	11.73	54.03
30	Manipur	5.10	1.10	0.30	6.50	236.00	21.61	4.66	1.27	27.54
31	Meghalaya	3.03	1.52	0.48	5.03	337.00	8.99	4.51	1.42	14.93
32	Nagaland	0.77	0.48	0.17	1.42	402.00	1.92	1.19	0.42	3.53
33	Arunachal Pr.	0.52	0.22	0.09	0.83	276.00	1.88	0.80	0.33	3.01
34	Mizoram	2.05	2.43	1.12	5.60	95.00	21.58	25.58	11.79	58.95
35	Sikkim	0.00	0.00	0.00	0.00	118.00	0.00	0.00	0.00	0.00
	NE TOTAL	**162.24**	**69.73**	**80.41**	**312.38**	**5743.00**	**28.25**	**12.14**	**14.00**	**54.39**
	ALL INDIA	**16558.23**	**8049.71**	**3514.27**	**28122.21**	**195103.00**	**84.87**	**41.26**	**18.01**	**144.14**

*** Estimated (Based on 2008-09 Grossed Cropped area)**

Annex 7

State-wise Number of Soil Testing Laboratories in the country, their Analyzing Capacity and its Utilization during 2010-11

Sl. No	Name of the State	No of Soil Testing Laboratories							Annual Analyzing Capacity in '000'	Sample Analyzed in'000'	Capacity Utilization (%)
		State Govt.		Fert. Industry		Total					
		Static	Mobile	Static	Mobile	Static	Mobile	Total			
I	**South Zone**										
1	Andhra Pr.	84	5	25	4	109	9	118	543.00	462.52	85.18
2	Karnataka	22	0	3	1	25	1	26	211.00	143.85	68.18
3	Kerala	14	9	1	0	15	9	24	291.00	173.45	59.60
4	Tamil Nadu	30	16	1	0	31	16	47	1147.4	786.27	68.53
5	Puducherry	2	0	0	0	2	0	2	4.00	4.03	100.75
6	A&N Island	1	1	0	0	1	1	2	12.00	4.73	39.42
	Total	**153**	**31**	**30**	**5**	**183**	**36**	**219**	**2208.40**	**1574.85**	**71.31**
II.	**West Zone**										
7	Gujarat	142	2	3	1	145	3	148	930.00	1898.09	204.10
8	Madhya Pr.	24	0	2	4	26	4	30	405.00	225.64	55.71
9	Maharashtra	29	0	6	4	35	4	39	378.00	379.10	100.29
10	Rajasthan	22	23	1	2	23	25	48	445.00	348.27	78.26
11	Chhattisgarh	6	4	0	0	6	4	10	70.00	92.63	132.33
12	Goa	1	1	0	0	1	1	2	25.00	20.64	82.56
	Total	**224**	**30**	**12**	**11**	**236**	**41**	**277**	**2253.00**	**2964.37**	**131.57**
III	**North Zone**										
13	Haryana	30	1	1	0	31	1	32	312.50	363.99	116.48
14	Punjab	54	12	1	3	55	15	70	622.00	224.14	36.04
15	Uttarakhand	13	3	0	0	13	3	16	106.44	88.18	82.84
16	Uttar Pradesh	255	18	7	3	262	21	283	4186.00	2715.42	64.87
17	Himachal Pr.	11	4	0	0	11	4	15	125.00	122.83	98.26
18	J&K	12	6	0	0	12	6	18	76.00	33.52	44.11
19	Delhi	1	0	0	0	1	0	1	0.80	0.61	76.25
	Total	**376**	**44**	**9**	**6**	**385**	**50**	**435**	**5428.74**	**3548.69**	**65.37**
IV	**East Zone**										
20	Bihar	39	0	0	0	39	0	39	220.00	123.75	56.25
21	Jharkhand	7	1	0	0	7	1	8	59.30	10.89	18.36
22	Orissa	11	0	0	0	11	0	11	132.00	124.11	94.02
23	West Bengal	10	8	0	2	10	10	20	122.00	29.80	24.43
	Total	**67**	**9**	**0**	**2**	**67**	**11**	**78**	**533.30**	**288.55**	**54.11**
V	**NE Zone**										

24	Assam	7	4	0	0	7	4	11	84.00	59.29	70.58
25	Tripura	2	4	0	0	2	4	6	32.00	11.55	36.09
26	Manipur	4	1	0	0	4	1	5	40.00	1.38	3.45
27	Meghalaya	3	0	0	0	3	0	3	30.00	9.30	31.00
28	Nagaland	3	0	0	0	3	0	3	45.00	12.50	27.78
29	Arunachal Pr.	3	3	0	0	3	3	6	9.00	8.40	93.33
30	Sikkim	1	0	0	0	1	0	1	8.00	7.50	93.75
31	Mizoram	2	3	0	0	2	3	5	24.00	20.00	83.33
	Total	**25**	**15**	**0**	**0**	**25**	**15**	**40**	**272.00**	**129.92**	**47.76**
	Grand Total	**845**	**129**	**51**	**24**	**896**	**153**	**1049**	**10695.44**	**8506.38**	**79.53**

Annex 8

State-wise distributionof Soil Health Cards to the Farmers

(in lakh)

State/UT	Cumulative till 2007-08	During year 2008-09	Cumulative till 2008-09	During year 2009-10	Cumulative till 2009-10	SHC issued by State 2010-11	SHC issued by Fert Cos 2010-11	Total during yr 2011	cumulative till 2010-11
South Zone									
Andhra Pradesh	22.74	4.36	27.10	5.70	32.80	5.10	0.01	5.11	37.91
Karnataka	53.26	1.50	54.76	1.71	56.47	1.09	0.02	1.11	57.58
Kerala	13.76	0.08	13.84	2.10	15.94	1.01	0.02	1.03	16.97
Tamil Nadu	10.51	3.91	14.42	6.22	20.64	7.15	0.003	7.15	27.79
Pondicherry	0.13	0.02	0.15	0.02	0.167	0.023	0.00	0.02	0.19
A&N Island	0.03	0.00	0.00	0.01	0.012	0.013	0.00	0.01	0.03
S Zone Total	**100.43**	**9.87**	**110.27**	**15.76**	**126.03**	**14.39**	**0.05**	**14.44**	**140.47**
West Zone									
Gujarat	18.57	1..27	19.84	0.61	20.45	12.04	0.06	12.1	32.55
Madhya Pradesh	11.07	1.71	12.78	1.61	14.39	2.01	0.17	2.18	16.57
Maharashtra	10.64	2.27	12.91	2.78	15.69	2.95	0.00	2.95	18.64
Rajasthan	12.00	3.00	15.00	2.85	17.85	3.12	0.03	3.15	21.00
D&N Haveli	0.05	0.00	0.05	0.00	0.05	0.00	0.00	0	0.05
Chhatisgarh	1.78	0.41	2.19	0.59	2.78	0.95	0.00	0.95	3.73
Goa	1.42	0.20	1.62	0.23	1.85	0.21	0.00	0.21	2.06
W Zone Total	**55.53**	**8.55**	**64.39**	**8.67**	**73.06**	**21.28**	**0.26**	**21.54**	**94.60**
North Zone									
Haryana	2.54	2.06	4.60	3.34	7.94	3.57	0.07	3.64	11.58
Punjab	10.95	6.32	17.27	2.98	20.25	2.04	0.12	2.16	22.41
Uttarakhand	0.65	0.35	1.00	0.47	1.47	0.37	0.00	0.37	1.84
Uttar Pradesh	18.74	20.65	39.39	19.39	58.78	25.80	0.17	25.97	84.75
Himachal Pr.	5.45	1.11	6.56	1.30	7.86	1.35	0.00	1.35	9.21
J&K	0.54	0.09	0.63	0.20	0.83	0.30	0.00	0.3	1.13
Delhi	0.04	0.01	0.05	0.01	0.06	0.006	0.00	0.006	0.066
N Zone Total	**38.91**	**30.59**	**69.50**	**27.69**	**97.19**	**33.436**	**0.36**	**33.796**	130.986
East Zone									
Bihar	2.42	1.03	3.45	1.44	4.89	1.24	0.00	1.24	6.13
Jharkhand	0.61	0.50	1.45	0.10	1.55	0.07	0.00	0.07	1.62
Orissa	16.04	1.15	17.19	1.30	18.49	1.24	0.00	1.24	19.73
West Bengal	2.05	0.48	2.53	0.36	2.89	0.19	0.00	0.19	3.08

E Zone Total	**21.12**	**3.16**	**24.62**	**3.20**	**27.82**	**2.74**	**0.00**	**2.74**	**30.56**
North East Zone									
Assam	3.30	0.61	3.91	0.60	4.51	0.60	0.00	0.60	5.11
Tripura	0.60	0.20	0.80	0.12	0.92	0.12	0.00	0.12	1.04
Manipur	0.54	0.25	0.79	0.25	1.04	0.25	0.00	0.25	1.29
Meghalaya	0.53	0.11	0.64	0.08	0.72	0.02	0.00	0.02	0.74
Nagaland	0.53	0.11	0.02	0.11	0.13	0.12	0.00	0.12	0.25
Arunachal Pr.	1.42	0.08	1.50	0.06	1.56	0.09	0.00	0.09	1.65
Sikkim	0.32	0.07	0.39	0.07	0.46	0.07	0.00	0.07	0.53
Mizoram	0.57	0.00	0.57	0.20	0.77	0.20	0.00	0.20	0.97
NE Zone Total	**7.81**	**1.43**	**8.62**	**1.49**	**10.11**	**1.47**	**0.00**	1.47	11.58
Grand Total	**223.80**	**53.60**	**277.40**	**56.81**	**334.21**	**73.31**	**0.67**	**73.99**	**408.19**

List of 1st 100 Districts having fertilizer consumption

1. Andhra Pradesh - (i) Guntur, (ii) West Godavari, (iii) Karimnagar, (iv) Krishna (v) Kurnool, (vi) Nalgonda, (vii) East Godavari (viii) Warangal, (ix) Nizamabad, (x) Prakasam, (xi) Nellore, (xii) Khammam, (xiii) Mahaboobnagar, (xiv) Adilabad, (xv) Anantapur, (xvi) rangareddy, (xvii) Kadapa, (xviii) Medak.

2. Maharashtra – (i) Jalgoan, (ii) Ahmednagar, (iii) Pune, (iv) Nanded, (v) Nasik, (vi) Solapur, (vii) Sangli, (viii) Satara, (ix) Jalna, (x) Aurangabad, (xi) Buldhana, (xii) Kolhapur.

3. Punjab – (i) Ferozepur, (ii) Sangrur, (iii) Ludhiana, (iv) Patiala, (v) Bhatinda, (vi) Jalandhar, (vii) Gurdaspur, (viii) Muktsar, (ix) Amritsar, (x) Moga.

4. Karnataka- (i) Belgaum, (ii)Bellary, (iii) Raichur, (iv) Gulbarga, (v) Mandya, (vi) Davanagere, (vii) Koppal.

5. West Bengal- (i) Burdwan, (ii) Hooghly, (iii) Murshidabad, (iv) Midnapur, (W) (v) Malda, (vi) Nadia, (vii) Birbhum, (viii) Midnapur(E), (ix) Uttar Dinajpur, (x) N.24-Parganas, (xi) Jalpaiguri.

6. Gujarat- (i) Rajkot, (ii) Surat, (iii) Bhavnagar, (iv) Junagadh, (v) Banaskantha, (vi) Vadodara, (vii) Sabarkantha, (viii) Anand, (ix) Ahmedabad, (x) Surendranagar.

7. Uttar Pradesh- (i) Shahjahpur, (ii) Allahabad, (iii) Kheri, (iv) Moradabad, (v) Sitapur, (vi) Bareilly, (vii) Muzaffarnagar, (viii) Bulandshahar, (ix) Gorakhpur, (x) Pilibhit, (xi) Barabanki, (xii) Kanpur (Nagar), (xiii) Hardoi, (xiv) Bijnor, (xv) Meerut, (xvi) Etah, (xvii) Aligarh.

8. Haryana- (i) Sirsa, (ii) Karnal, (iii) Hisar, (iv) Fatehabad, (v) Kurukshetra, (vi) Jind, (vii) Kaithal, (viii) Faridabad, (ix) Sonipat.

9. Tamil Nadu- (i) Tiruchirapalli, (ii) Erode, (iii) Salem.

10. Uttarakhand- U.S. Nagar.

11. Chhattisgarh- Raipur.

12. Rajasthan- Sriganganagar.