REPORT

ON

OPTIMIZATION OF FERTILIZER USAGE

सत्यमेव जयते

Government of India
Cabinet Secretariat
Committee on Optimization of Fertilizer Usage

CONTENTS

FOREWORD

The Finance Minister in his Budget Speech on 6th July 2009 stated: "In the context of the nation's food security, the declining response of agricultural productivity to increased fertilizer usage in the country is a matter of concern. To ensure balanced application of fertilizers, the Government intends to move towards a nutrient based subsidy regime instead of the current product pricing regime. It will lead to availability of innovative fertilizer products in the market at reasonable prices. This unshackling of the fertilizer manufacturing sector is expected to attract fresh investments in this sector. In due course it is also intended to move to a system of direct transfer of subsidy to the farmers".

On Fertilizer subsidy, FM stated: "I had announced the intent of the Government for the fertilizer sector in my Budget Speech of 2009. A Nutrient Based Subsidy policy for the fertilizer sector has since been approved by the Government and will become effective from April 1, 2010. This policy is expected to promote balanced fertilization through new fortified products and focus on extension services by the fertilizer industry. This will lead to an increase in agricultural productivity and consequently better returns for the farmers. Over time, the policy is expected to reduce volatility in the demand for fertilizers in addition to containing the subsidy bill. Government will ensure that nutrient based fertilizer prices for transition year 2010-11, will remain around MRPs

currently prevailing. The new system will move towards direct transfer of subsidies to the farmers."

The Committee on Optimization of Fertilizer Usage was constituted by the Cabinet Secretariat on 23rd March 2010 in the light of the above to examine fertilizer usage patterns, including use of micro-nutrients and suggesting a medium to long term plan for optimizing their usage. The Committee agreed that the road map for moving fully towards a nutrient based subsidy regime and to move, in due course, to a system of direct transfer of subsidy to farmers will be done by the Department of Fertilizers in accordance with the announcements made in the Budget Speech. Proposals in this regard will be placed before the Competent Authorities by the Department concerned.

The Committee, therefore, decided to confine its work to suggesting a roadmap for optimization of fertilizer usage taking into account the current pattern of fertilizer usage, the trends of growth in consumption of fertilizers, fertilizer efficiency, regional imbalances in use, dependence on imported fertilizers, local capacity and availability issues, sustainability issues and above all concerns of food security.

The Committee authorized the Chairman to hold discussions with the stakeholders wherever necessary. Accordingly, meetings were held with representatives of the Fertilizer Industry, Scientists of ICAR and representatives of major State Agriculture Departments etc. Important suggestions and inputs were received from all of them.

The report does not suggest an exact road map in terms of rationalization of Fertilizer Subsidy but underlines the need to shift to a full Nutrient Based Subsidy (including Urea) sooner than later. Many of the recommendations in the report presume that this will be done as early as possible. Most of the recommendations hold good in the proposed direct transfer to farmers' regime as well.

I place on record the excellent contribution made by Dr. P.D. Sharma, Assistant Director General (Soils), ICAR, Mr. Satish Chander, Director General and Mr. A.K. Chanda, Chief (Statistics and IT) of The Fertilizer Association of India. The Committee did not have a Secretary and other staff. It functioned with two support staff. Mr. N.R.Muralidharan, Sr. PPS of Department of Agriculture and Cooperation and Ms. Meenakshi Malik, Personal Assistant, Department of Fertilizer worked with dedication throughout the period of six months and ensured that the Committee functioned smoothly. I place on record my appreciation for their services.

I thank all the Members of the Committee, especially Mr. S. Krishnan, the then Secretary, Department of Fertilizers for their involvement and cooperation.

I hope this report will be useful for the policy makers to devise policy instruments to ensure optimal use of fertilizers and in ensuring sustainable increase in production of agricultural goods.

(T. Nanda Kumar)

New Delhi
20th September 2010

Chapter - I

A BRIEF SYNOPSIS OF FERTILISER POLICY

Introduction

I.1 The Fertiliser Policy of Government of India has undergone many changes over the years. The over-riding concern for food security coupled with the need to make available critical farm inputs to farmers at affordable prices seem to have been the driving force behind the policy interventions. Volatility in international prices did make the policy planners rethink on strategy on many occasions. A large number of well known experts in the field of agriculture and economics have chaired these Committees. A brief synopsis of the major changes in policy is reproduced below for easy reference (courtesy: Fertiliser Association of India).

1957: Fertiliser Control Order

I.2 The first step to regulate the sale, price, and the quality of fertilizers was taken when the Government of India passed the Fertiliser Control Order (FCO) in 1957 under the Essential Commodities Act (ECA).

1965: Committee on Fertilisers (Sivaraman Committee)

I.3 A 'Committee on Fertilisers' was constituted in 1964, headed by **Shri B. Sivaraman**, Secretary, Department of Agriculture, Government of India, to examine the problems connected with the distribution of all chemical fertilisers, pricing of fertilisers, role of cooperatives in their marketing, and the role of extension services in the promotion and popularization of the use of fertilisers. The Sivaraman Committee submitted its report in 1965. The Committee made a number of recommendations covering production, promotion, distribution, and consumption of fertilizers in the country.

1966: Liberalisation of Fertiliser Marketing

I.4 Fertiliser marketing was liberalised as per the recommendations of the Sivaraman Committee Report. The manufacturers were given freedom to market up to 50% of their production.

1969:

I.5 By 1969, domestic manufacturers were given complete freedom in marketing. But this was short-lived.

1972: Half-yearly Zonal Conferences

I.6 In the early seventies, shortages of fertilisers were experienced in the country. Consequently, the government started regulating the distribution of fertilisers under the Essential Commodities Act (ECA) and the concept of Half-yearly Zonal Conferences was introduced in 1972. All the fertilisers were distributed by the manufacturers according to their ECA allocation during the two cropping (Kharif and Rabi) seasons, as per the supply plan fixed at the zonal conferences.

1973: Fertiliser Movement Control Order

I.7 Fertiliser shortages in the early 70's led the Government to pass the Fertiliser Movement Control Order in 1973, which brought fertilizer distribution and its inter-state movement under Government control.

1977: Fertilizer Prices Committee (Marathe Committee)

I.8 During mid-70's, the prices of fertilisers escalated steeply in the international market as a result of the oil crisis. To keep farm gate prices of fertilisers at an affordable level in the face of rising production / import costs, the Ministry of Chemicals & Fertilizers constituted a committee in January 1976, namely, "Fertilizer Prices Committee," under the chairmanship of **Shri S. S. Marathe**, Chairman, Bureau of Industrial Costs, and Prices. The Committee was also asked to evolve a pricing policy for imported fertilisers in relation to cost of imports. The Committee submitted Part-I of its Report in May 1977. Based on the recommendations of the Marathe Committee, the Retention Price Scheme (RPS) was introduced for various fertilisers. *The RPS for nitrogenous fertilisers (except Ammonium Chloride) was introduced in November 1977.*

1979:

I.9 **The Fertilizer Prices Committee submitted Part II of its report in 1978** which covered pricing of complex fertilisers, equated freight, and distribution of fertilisers. The committee recommended the continuation of ECA allocations introduced in July 1972 and introduction of an equated freight system for each unit. The recommendations of the Committee were accepted. *The RPS for complex fertilizers and the Equated Freight Scheme were introduced in February 1979.*

1980-81: Decontrol of Ammonium Sulphate (A/S), and Calcium Ammonium Nitrate (CAN)

I.10 The prices of A/S and CAN (25% N) were decontrolled from 8th June, 1980.

Block Delivery Scheme

I.11 To promote the use of fertilisers in remote and inaccessible areas, the Government introduced "Block Delivery Scheme" (BDS) during 1980-81. The objective of the policy was to encourage opening of retail outlets in the interiors away from the railheads. After the introduction of BDS, the Government allowed the reimbursement of cost of secondary freight from railheads to the block headquarters.

1982:

I.12 **SSP was brought under RPS in May 1982.**

1984: A/S and CAN brought under price control

I.13 A/S and CAN were brought under statutory price control w.e.f 21st August, 1984 and 7th September, 1984, respectively.

1985:

I.14 **Ammonium Chloride was brought under RPS during 1985.**

1986: High Powered Committee of Secretaries (B. B. Singh Committee)

I.15 In April 1983, Government of India constituted a "High Powered Committee of Secretaries", headed by **Shri B. B. Singh**, Secretary (Fertilizers), to conduct an in depth study of the Retention Prices Scheme, covering the cost of production, the capital cost of fertiliser plants, the cost of inputs, and seeking an analysis of the factors contributing to the increase in the cost of production and subsidy in order to suggest remedial measures to contain the subsidies.

I.15.1 The Committee evolved a group retention price for each of the different feedstock for existing units and recommended a shift to uniform price later so as to allow plants time to adjust. The Committee favoured a tariff adjusted import parity price for new gas based units. *None of the major recommendations of the Committee were accepted.*

1987: High Powered Committee on Fertilizer Consumer Prices (G. V. K. Rao Committee)

I.16 The Government of India set up a "High powered Committee on Fertilizer Consumer prices" on 1st May'84. Initially, **Dr. A. S. Kahlon** was appointed Chairman of the Committee. Consequent to the resignation of Dr.

Kahlon, **Dr. G. V. K. Rao**, I.A.S (Retd.) was appointed Chairman of the Committee effective from July, 1985. The committee submitted its report in 1987 in which, it made several recommendations.

1991: Dual Pricing

I.17 The retail prices of fertilisers were raised by 30 per cent w. e. f 14th August 1991. The Government of India tried to experiment with "dual pricing" of fertilisers on a limited scale by exempting small & marginal farmers from the hike of 30 percent on the retail prices of fertilisers with effect from 14th August, 1991. The Government earmarked funds on the basis of the area held by the small and marginal farmers upto a limit of 2 hectares and the average per hectare consumption of fertilisers during 1990-91 in each state. But the scheme did not succeed. It was operational for a brief period, from 14th August 1991 to 31st March 1992 and was discontinued thereafter.

Decontrol of A/S, CAN and Ammonium Chloride

I.18 The prices of Ammonium Sulphate, CAN and Ammonium Chloride were decontrolled w. e. f 25th July, 1991.

1992: BICP Report on Normative Retention Price of Fertilizers

I.19 BICP undertook a study to assess the feasibility of a group retention price for new gas based fertiliser plants along the HBJ pipeline. The "BICP study" recommended a normative approach for determining capital costs for the gas based units. The normative cost approach was meant to encourage more efficient investment and provide a more prudent design approach. *The recommendations of the Committee were **not** implemented.*

1992: Joint (Parliamentary) Committee on Fertilizer Pricing

I.20 A Joint Committee on Fertilizer Pricing was formed in 1991 under the Chairmanship of Shri Pratap Rao Bhosale, Member of Parliament (Lok Sabha), to review the method of computation of Retention Prices for different manufacturers of fertilisers and to suggest whether there was any scope for reducing fertiliser prices within the existing scheme or whether a new methodology for fertiliser pricing could be evolved without causing undue strain to the exchequer, and at the same time assuring fair prices to the farmers and a fair return to the manufacturers. The Committee submitted its report on the 20th August, 1992.

Decontrol of P & K fertilizers

I.21 Based on the recommendations of the Joint (Parliamentary) Committee on Fertiliser Pricing, the prices, movement and distribution of all Phosphatic and Potassic fertilisers were decontrolled w.e.f. 25th August, 92.

Ammomium Sulphate, CAN and Ammonium Chloride brought under price control

I.22 Ammomium Sulphate, CAN and Ammonium chloride were brought back under statutory control w. e. f 25th August, 1992.

Decanalisation of Raw materials, Intermediates and DAP

I.23 The import of Rock Phosphate and Sulphur was decanalised w.e.f 1st March'92. Import of Ammonia and Phosphoric acid was decanalised w.e.f 1st April'92. Import of DAP was decanalised w. e. f 17th September'92.

Concession on decontrolled P & K fertilisers introduced

I.24 As a result of the decontrol of Phosphatic and Potassic fertilisers, the retail prices of these fertilisers increased significantly. With a view to partially compensate the increased cost of decontrolled fertilisers, an *adhoc concession* (later termed as *concession*) of Rs.1000 per tonne each for DAP and MOP, Rs.435-999 per tonne for NP/NPK fertilisers was announced effective from Rabi 1992-93. The rates of concession were revised from time to time in the later years.

1993: Decanalisation of MOP

I.25 Import of MOP was decanalised **w. e. f 17th June,'93**.

Adhoc concession on SSP

I.26 Adhoc concession for SSP was announced from **Kharif 1993**.

1994: Decontrol of A/S, CAN and Ammonium Chloride

I.27 The prices of Ammonium Sulphate, CAN and Ammonium Chloride were decontrolled w. e. f 10th June, 1994.

1998: High Powered Fertilizer Pricing Policy Review Committee (HPC) (Hanumantha Rao Committee)

I.28 The Government of India constituted a 'High Powered Fertilizer Pricing Policy Review Committee (HPC)' under the Chairmanship of **Prof. C. H. Hanumantha Rao**, former member, Planning Commission to review the existing system of subsidization of urea, suggest an alternative broad-based, scientific, and transparent methodology, and recommend measures for greater cohesiveness in the policies applicable to different segments of the industry. The HPC, which submitted its report to the Government on 3rd April 1998, recommended that unit-wise RPS for urea may be discontinued and a uniform Normative Referral Price (NRP) be fixed for existing gas based urea units and also for DAP. A Feedstock Differential Cost Reimbursement (FDCR) could be given for a period of five years for non-gas urea units.

2000: Expenditure Reforms Commission (ERC)

I.29 The Expenditure Reforms Commission headed by **Shri K. P. Geethakrishnan**, former Finance Secretary, had gone into the question of rationalizing fertilizer subsidies. The Commission submitted its report on the 20th September, 2000. It recommended the dismantling of the control system in a phased manner, leading to a decontrolled fertiliser industry at the commencement of fourth stage, which can compete with imports albeit with a small level of protection and a feedstock cost differential compensation to Naphtha / LNG based units to ensure self-sufficiency.

(a) First stage (1.2.2001 to 31.3.2002) – The existing urea manufacturing units will be grouped into 5 categories – (i) pre-1992 gas based units, (ii) post 1992 gas based units, (iii) Naphtha based units, (iv) FO/LSHS based units and (v) mixed feedstock units. The individual retention prices to be replaced by a fixed concession for units in each of these groups. Distribution control will be done away with. The system of the determination of maximum retail price by the Government to be continued.

(b) Second stage (1.4.2002 to 31.3.2005) – The concession to be reduced to reflect the possibility of reasonable improvement in feedstock use efficiencies and reduction in capital related charges.

(c) Third stage (1.4.2005 to 31.3.2006) – It reflects the feasibility of all non-gas based plants of modernizing and switching over to LNG. For plants which will not be able to switch over to LNG as feedstock, only the level of concession that the unit would have been entitled to if it had switched over to LNG would be allowed.

(d) Fourth stage (from 1.4.2006) - The fourth stage, to commence from 1st April, 2006 when the industry was to be decontrolled. The commission recommended a 7 per cent increase in the price of urea every year from

1.4.2001. This way the open market price will reach Rs.6903 per tonne by 1.4.2006, a level at which the industry could be freed from all controls and be expected to compete with imports, with a variable levy to ensure availability of imported urea at the farm gate price of Rs.7000 per tonne. No concession will be necessary from this date onwards for gas based plants. The fuel oil/ LSHS and mixed feed stock plants, existing naphtha plants converting to LNG, as also new plants and substantial additions to existing plants will be entitled to a feed stock differential with that for LNG plants serving as a ceiling.

I.30 The ERC also recommended that the farm-gate prices of nitrogenous, Phosphatic and Potassic fertilisers should be fixed so as to promote balanced fertiliser use. It was suggested that once the price of urea is re-determined every six months, the prices of Potassic and Phosphatic fertilisers should be suitably adjusted to ensure the desired NPK balance.

2001: Expert Committee on Reassessment of Production Capacity (Alagh Committee)

I.31 An "Expert Committee" under the Chairmanship of **Dr. Y. K. Alagh** was constituted to reassess the production capacity of Urea manufacturing units. The terms of reference of the Committee included (a) the method of reassessment to be adopted, (b) the effective cut off date to be adopted for the purpose of recovery on the method of reassessment, (c) quantification of total amount of unintended benefits accrued to each unit and suggest modalities to recover the amounts thus quantified. The Committee submitted its report in March 2001. Based on the recommendations of the Committee, the capacities of 22 Ammonia-Urea plants were reassessed with effect from 1.4.2000 for the purpose of pricing and subsidy.

Cost Price Study of Complex Fertilizers (Tariff Commission)

I.32 The Tariff Commission undertook a 'Cost Price Study of Complex Fertilizers' to decide the rates of concession of decontrolled complex fertilisers covered under the Concession Scheme. The commission submitted its report in May 2001. The Commission recommended the delivered prices of various complex fertilizers for (a) Group I comprising units with gas as feedstock, (b) Group II comprising of the units using predominantly naphtha. The Commission also recommended that the Department of Fertilizers may consider carrying out cost-benefit analysis to assess desirability for switching over to imported Ammonia by the units under Group II to reduce costs and concessions.

Committee on Efficient Energy Levels, etc. for Urea Units (Gokak Committee)

I.33 Based on the suggestions made by the ERC, Government of India appointed a Committee on 'Efficient Energy Levels, etc. for Urea Units' under the Chairmanship of Shri A. V. Gokak, to suggest energy

consumption norms for urea units and other related matters with a view to doing away with the individual RPS and introduce a Group Concession Scheme. The Committee submitted its report during May 2003.

I.33.1 The Committee suggested three stages for its recommendations, viz., Stage I – 1.4.2003 to 31.3.2004, Stage II – 1.4.2004 to 31.3.2006, and Stage III – 1.4.2006 onwards.

I.33.2 The Committee recommended to group urea units into six categories, viz., i) pre-'92 gas based plants, ii) post -'92 gas based plants, iii) pre-'92 Naphtha based plants, iv) post -'92 Naphtha based plants, v) FO/LSHS based plants, vi) mixed energy based plants. In case consumption of alternative feedstock/fuel in a gas based unit exceeds 25%, the classification of the unit should be shifted from gas based to the mixed energy group until the mix again changes warranting its inclusion in the gas based group.

New Pricing Scheme for Urea units (NPS) (Stage I and II)

I.34 Based on the recommendations of various Committees, a new pricing policy for Urea units was approved by the Government. The New Pricing Scheme came into force w .e. f 1. 4. 2003. The new policy aimed at greater transparency, uniformity, and efficiency in disbursements of subsidy payments to urea units and inducing them to take cost reduction measures on their own and be competitive. The scheme was implemented in three stages.

(a) Stage-I for one-year duration from 1.4.2003 to 31.3.2004

(b) Stage-II for two years duration from 1.4.2004 to 31.3.2006

(c) Stage- III from 1.4.2006 onwards. The modalities were to be decided by the Department of Fertilizers (DOF) after review of the implementation of Stage-I and Stage-II.

I.34.1 The scheme introduced a group based concession, which replaced RPS. The NPS envisaged phased decontrol of movement, distribution and sale of urea which was hitherto entirely under the purview of ECA allocations. For the Kharif 2003 season, 75% of the despatches of each manufacturer was covered under ECA allocation and the balance 25% could be sold freely anywhere in India. For the Rabi 2003-04 seasons, this ratio was changed to 50:50. The scheme is still continuing. For quantities sold under the ECA, units are allowed equated freight in the same manner as for the 8th pricing period. For urea sold under the free category (urea outside the ECA allocation), the equated freight has been reduced by Rs.100/te. Under Stage II of NPS, the capital related charges and consumption norms were tightened.

2005: Working Group on Review of Stage I & II of New Pricing Scheme (NPS) and formulation of Policy for Stage III for Urea units (Alagh Committee)

I.35 The New Pricing Scheme (NPS) for Urea in force from the 1st April, 2003 was to be implemented in three stages. Stage-I was applicable for one year i.e., up to the 31st March, 2004 and the second stage was for two years from the 1st April, 2004 to the 31st March, 2006. The policy for Stage-III commencing from the 1st April, 2006 was to be formulated and announced based on the experience of Stages I and II. Accordingly, the Government of India set up a 'Working Group on Review of Stage I & II of New Pricing Scheme (NPS) and formulation of Policy for Stage III for Urea units' under the Chairmanship of **Dr. Y.K. Alagh** on the 10th December, 2004. The Working Group submitted its report in December 2005.

Expert Group on Phosphatic Fertilizer Policy (Abhijit Sen Committee)

I.36 The Government of India constituted an 'Expert Group on Phosphatic Fertilizer Policy' under the Chairmanship of Prof. Abhijit Sen, Member, Planning Commission to review the current Phosphatic fertiliser environment, examine international and Indian Phospahtic fertiliser scenario and examine alternatives to the existing methodology of Phosphatic fertilizer pricing and costing. The Expert Group submitted its report during October 2005. The Committee made a number of recommendations and suggested the subsidy on DAP to form the basis for subsidy on other Phosphatic and complex fertilisers. The subsidy on DAP would have 3 components, viz. (1) difference in the landed price of imported DAP (including customs duty) and the MRP, (2) cost of marketing including the selling and distribution expenses and dealers' margin (Rs.350 per tonne) and (3) to offset disadvantage to the domestic manufacturers vis-à-vis those abroad. Floor and ceiling for the disadvantage has been recommended as 5% and 20% of CFR price of DAP to be reviewed subsequently.

Task Force on Balanced Use of Fertilisers

I.37 The imbalanced use of chemical fertilisers and neglect of organic manure caused many problems, like stagnation in productivity, soil sickness, widespread deficiency of secondary and micro nutrients, spread in salinity and alkalinity, etc. The fertiliser use is also skewed in the country. In this context, the Ministry of Agriculture constituted a 'Task Force on Balanced Use of Fertilisers', under the Chairmanship of **Shri A. K. Singh,** Additional Secretary, Department of Agriculture and Cooperation to relook at the policy on use of fertilisers. The Committee recommended the restoration of NPK use ratio at the macro level by increasing the use of nutrients P and K instead of reducing the intake of Nitrogen. However at the micro level, the application of nutrient has to be soils, crops, and climate specific. Among other major recommendations, the Committee suggested strengthening of soil testing laboratories, fertiliser quality control laboratories, efforts for promotion of green manures, vermi compost, enriched organic manures,

micronutrients, expansion of area under fertigation, etc. The Committee also felt the need for recognition of sulphur as a critical input at par with NPK for price fixation and subsidy and the extension of subsidy to other secondary and micro nutrients. The existing pricing mechanism need to be made conducive for balanced fertilization by properly adjusting the pricing and subsidy on nutrient basis. *The recommendations of the Report have been accepted in principle.*

2007: New Pricing Scheme for Urea units (NPS) (Stage III)

I.38 The Government notified the New Pricing Scheme (NPS) Stage III for Urea units on the on the 8th March, 2007. The NPS Stage II scheduled to be expired by the 31st March, 2006 was extended upto 30th September, 2006. The NPS Stage III came into force from 1st October 2006 and will be effective upto 31st March 2010. The policy aims at greater efficiency in Urea production and its distribution in the country.

I.38.1 The Policy seeks to encourage urea production from the indigenous urea units beyond 100% of their reassessed capacity by introducing a system of incentives for additional urea production subject to merit order procurement. All production between 100% and 110% of the existing reassessed capacity, as per the approved production plan will be incentivized on the existing net gain sharing formula between the Government and the unit in the ratio of 65:35, respectively. Units increasing production beyond 110% may be compensated at their concession rate, subject to the overall cap of Import Parity Price (IPP). The provision of prior Government permission for additional urea production has been dispensed with.

I.38.2 NPS Stage III sought to promote the usage of natural gas, which is an efficient and comparatively cheaper feedstock for production of Urea. A definite time schedule of three years has been provided for conversion of all non-gas based units to gas. To expedite conversion, the Policy provides for non-mopping up of energy efficiency for a period of five years for Naphtha and F.oil/ LSHS based plants. Units not able to tie up gas will have to explore alternative feedstock like coal bed methane (CBM) and coal gas.

I.38.3 The Policy encourages setting up joint venture (JV) fertiliser plants abroad in countries where gas is available in abundance and at reasonable prices. The JVs for urea will be set up abroad subject to the condition that the government will enter into long term buy back arrangements with JVs abroad depending upon merits.

I.38.4 The Government will continue to regulate movement of urea up to 50% of production depending upon the exigencies of the situation. States would be required to allocate the entire quantity of planned urea arrivals for regulated and deregulated urea in a district-wise, month-wise, and supplier-wise format. The units will be required to maintain a district level stock point (primary godowns) in the districts where it is required to supply urea. The monitoring of movement and distribution of urea throughout the country upto

district level will be done by an on-line web based system. The Department of Fertilizers (DOF), Ministry of Chemicals & Fertilizers, will operate a buffer stock through the State institutional agencies/ fertiliser companies in States upto a limit of 5% of their seasonal requirement.

Mono Ammonium Phosphate (MAP) brought under concession scheme

I.39 Imported MAP (11-52-0), including powdered MAP was brought under concession scheme for decontrolled phosphatic and potassic fertilisers w.e.f 1.4.2007. GOI decided that concession payable on these fertilisers will be capped to that payable on imported Di-Ammonium Phosphate (DAP) and no additional concession/ cost would be reimbursed for processing powdered MAP to granulated MAP.

1.39.1 Government of India included indigenous and imported Triple Super Phosphate (TSP 0-46-0) under the Concession Scheme for decontrolled Phosphatic and Potassic (P&K) Fertilizers w.e.f. 1st April 2008 with MRP of Rs.7460 per MT and indigenous Ammonium Sulphate (20.6-0-0-23, Caprolactum grade) produced by FACT and GSFC w.e.f. 1st July 2008 with MRP of Rs.10350 per MT.

Cost Pricing Study of DAP, Complex Fertilisers & MOP by Tariff Commission

I.40 The Department of Fertilizers entrusted a fresh Cost Price Study on the DAP, MOP and Complex Fertilisers to the Tariff Commission (TC) in November, 2006. The Commission submitted its report in December, 2007. Based on the Report of the TC submitted in December 2007 and the Abhijit Sen's Committee Report of February 2005, the Department introduced import parity based concession scheme for DAP, MAP and TSP w.e.f. 1st April 2008, which continued till 31st March 2010. Under the policy, price of phosphoric acid was derived based on the price of DAP and the price of imported ammonia, which was applied for computing the concession for complex fertilizers. Concession for complex fertilizers was computed based on the methodology of the TC.

2008: Guidelines for production and use of Customized Fertilisers

I.41 Keeping in view the focus of balanced fertilization, GOI formulated guidelines for production and use of customized fertilisers under Clause 20B of FCO, 1985. The guidelines were issued on March 11, 2008 to enable interested companies to initiate the process of developing different grades of customized fertilisers. The guidelines broadly covered the definition, eligibility criteria, grades, quality requirement, and tolerance limit, labeling and pricing of customized fertilisers.

I.41.1 As per the guidelines, permission for manufacture and sale of customized fertilisers shall be granted to the manufacturing companies

whose annual turnover is Rs.500 crores or above, having soil testing facility with annual capacity of 10,000 samples per annum and should have analyzing capacity for NPK, micronutrient and secondary nutrient. The proposed grades shall be based on area specific and crop specific soil testing results. All subsidized fertilisers can be used for manufacturing of customized fertilisers. The company shall fix reasonable MRP for its approved grades of customized fertilisers.

Policy for encouraging production and availability of fortified and coated fertilizers

I.42 To promote use of secondary and micro nutrients and to improve fertiliser use efficiency, the Government of India has allowed the fortification/ coating of fertilisers specified in Fertilizer Control Order (FCO), up to 20% of their total production w.e.f 1st June 2008. The manufacturers have also been allowed to charge additional cost involved in manufacture of these fertilisers from the consumers as per the Government guidelines. The manufacturers / producers of fertilisers are allowed to sell the FCO approved fortified/ coated subsidized fertilisers, except for Zincated urea and Boronated SSP at a price upto 5% above the MRP. For Zincated urea and Boronated SSP, the manufacturers are allowed to charge upto 10% above MRP of Urea and SSP, respectively.

2009: Revised policy for ad hoc concession for SSP

I.43 The revised policy for ad hoc concession for SSP came into force from 1st October, 2009. As per the revised policy, the Government has decided to leave the selling price of SSP open w.e.f 1st October, 2009 in place of existing all-India MRP of Rs.3400 per tonne for powered SSP. Accordingly, the selling price of granulated and boronated SSP will also be open. An ad hoc concession of Rs. 2000 per tonne will be provided to powered, granulated and boronated SSP w.e.f 1st October, 2009.

2010: Implementation of Nutrient Based Subsidy (NBS) for P & K Fertilisers

I.44 The Government of India introduced the first phase of the Nutrient Based Subsidy (NBS) Policy w.e.f. 1.4.2010. The NBS will be applicable for DAP, MOP, MAP, TSP and 12 grades of complex fertilizers and Ammonium Sulphate (Caprolactum grade by GSFC and FACT), which have already been covered under the concession scheme for P & K fertilizers. Primary nutrients, viz., N, P and K and nutrient Sulphur 'S' contained in the fertilizers will be eligible for NBS at the rate of Rs.23.227 per kg of 'N', Rs.26.276 per kg of 'P', Rs.24.487 per kg of 'K' and Rs. 1.784 per kg of 'S' for 2010-11. The NBS to be paid on each nutrient viz. N, P, K and S will be decided annually by the Government and will be converted into subsidy per tone for each subsidized fertilizers. Additional subsidy for fertilisers fortified with Zinc and Boron will be paid at the rate of Rs.500 per tonne and Rs.300 per tonne, respectively.

Implementation of Nutrient Based Subsidy for SSP

I.45 The Government of India introduced NBS policy for production and sale of SSP, w.e.f. 1.5.2010. The per kg NBS for nutrient 'P' for SSP would be Rs. 26.276 and for nutrient Sulphur Rs.1.784. Accordingly, per tonne NBS for Powered and Granulated SSP for 2010-11 would be Rs.4400, which would be inclusive of cost of freight. Additional per tonne subsidy of Rs.300 will be admissible for fortified SSP with Boron.

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Chapter - II

TRENDS IN FERTILIZER CONSUMPTION

2.1 Fertilizer consumption in India has been showing a continuous upward trend. It has increased from less than 1 million tons of total nutrients in the mid sixties to almost 24 million tons today. Introduction of high yielding varieties has boosted fertilizer usage. While data for consumption of N, P &K are available from 1950-51 onwards consumption of other nutrients are not available for the same period. The All India Consumption of N, P_2O_5 and K_2O is at **Annexure - II A.** A brief synopsis of All India consumption of N, P_2O_5 and K_2O for the period 2000-01 to 2008-09 is shown below:

Table - 1

ALL INDIA CONSUMPTION OF N, P_2O_5 & K_2O				
2000-01 to 2008-09				
				(`000 tonnes)
Year	N	P_2O_5	K_2O	Total ($N+P_2O_5+K_2O$)
2000-01	10,920.2	4,214.6	1,567.5	16,702.3
2002-03	10,474.1	4,018.8	1,601.2	16,094.1
2003-04	11,077.0	4,124.3	1,597.9	16,799.1
2004-05	11,713.9	4,623.8	2,060.7	18,398.4
2005-06	12,723.3	5,203.7	2,413.3	20,340.3
2006-07	13,772.9	5,543.3	2,334.8	21,651.0
2007-08	14,419.1	5,514.7	2,636.3	22,570.1
2008-09 (Provisional)	15,090.5	6,506.2	3,312.6	24,909.3

Note : Total may not exactly tally due to rounding off.

The CAGR for the above period is 4.73 % for N, 6.40% for P_2O_5 and 11.28% for K_2O.

2.2 It is not surprising therefore that the consumption of fertilizer products have also shown the same trend. The details of All India Consumption of Fertilizer products is at **Annexure – II B.** Details of consumption of Urea, SSP, MOP and DAP for the period 2000-01 to 2008-09 are given below:

Table - 2

ALL INDIA CONSUMPTION OF FERTILZER PRODUCTS
2000-01 TO 2008-09

			('000 tonnes)	
Year	Urea	SSP	MOP	DAP
2000-01	19,186.45	2,860.02	1,829.26	5,884.60
2004-05	20,665.19	2,549.35	2,406.20	6,255.78
2005-06	22,297.51	2,755.95	2,731.26	6,763.92
2006-07	24,337.66	2,910.47	2,585.61	7,381.00
2007-08	25,963.15	2,287.76	2,880.69	7,496.61
2008-09	26,649.21	2,616.61	4,077.33	9,231.21

2.3 The CAGR for the above mentioned period for fertilizer products is 4.80% for Urea, 6.6% for DAP and 12.13% for MOP respectively. SSP has shown a negative CAGR of 1.2%. These imply the following:

a) Most of the Nitrogen is supplied by application of urea (82% as per one FAO study), alternate sources are not prominent.

b) The reduction in use of SSP has contributed to the Sulphur deficiency in many parts of the country;

c) It appears that DAP has become a preferred fertilizer for farmers even though SSP has better technical value. The reduction in the use of SSP is attributable to major quality problems and lack of credible quality assurance systems. The manufacturers, however, attribute this to pricing policy issues.

2.4 One of the main concerns of Agricultural Scientists has been the disproportionate use of 'N' over other nutrients. There is, however, a correction taking place across the country. The table given below indicates the change in the consumption ratio of N & P_2O_5 in relation to K_2O:

Table - 3
ALL INDIA CONSUMPTION RATIOS OF N&P_2O_5 IN RELATION TO K_2O

Year	$N:P_2O_5:K_2O$		
	N	P_2O_5	K_2O
1990-91	6.0	2.4	1
2000-01	7.0	2.7	1
2004-05	5.7	2.2	1
2005-06	5.3	2.2	1
2006-07	5.9	2.4	1
2007-08	5.5	2.1	1
2008-09 (Provisional)	4.6	2.0	1

2.5 From the above, it is clear that over a period of six years the ratios have become more favourable and converging towards preferred NPK ratios. This has been achieved by more effective extension and by a policy that supports enhanced use of P&K than by reduction in use of 'N'. This trend needs to be continued and supported.

2.6 However, the State wise data points to a skewed use in many important States. The details are available at **Annexure – II C.**

2.7 There are concerns with reference to the "excessive" use of Urea and DAP in Haryana, Rajasthan, Punjab, Uttar Pradesh, Madhya Pradesh, Bihar and Gujarat. It is true that some States have made earnest attempts to balance the use of fertilizers, but many other States are yet to take concrete steps in this regard.

2.8 States which need correction in this regard and their consumption ratios of NPK for 2008-09 are as below:

Table - 4

State	N	P_2O_5	K_2O
Haryana	32.2	10.7	1
Rajasthan	30.2	13.6	1
Punjab	23.6	6.7	1
Uttar Pradesh	11.5	3.6	1
Madhya Pradesh	8.9.	5.9	1
Gujarat	5.8	2.5	1
Bihar	5.7	1.5	1

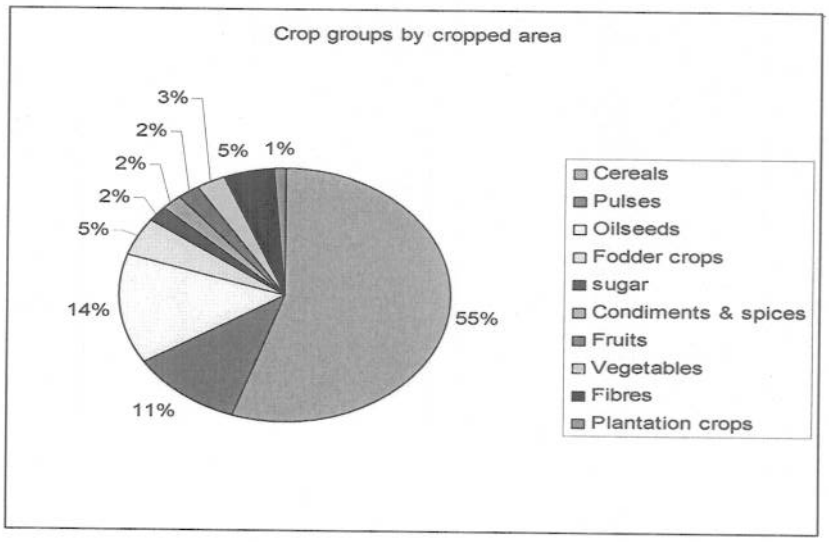
2.9 The intensity (per hectare consumption) of fertilizer consumption (NPK) is increasing. The following table indicates this. It has grown from 11.04 kg/hectare in 1969-70 to 128.5 kg./ hectare in 2008-09.

Table-5

The growth in intensity of fertilizer consumption (NPK) in India

ALL INDIA CONSUMPTION OF PLANT NUTRIENTS PER UNIT OF GROSS CROPPED AREA					
1951-52 to 2008-09					
Year	Gross cropped area (`000 ha.)	Consumption per hectare (kg)			
		N	P_2O_5	K_2O	Total
1969-70	162,265	8.36	2.56	1.29	12.21
1979-80	169,589	20.63	6.79	3.58	30.99
1989-90	182,269	40.52	16.54	6.41	63.47
1999-2000	188,402	61.53	25.47	8.91	95.91
2000-01	185,344	58.92	22.74	8.46	90.12
2001-02	189,680	59.63	23.10	8.79	91.52
2002-03	175,530	59.67	22.90	9.12	91.69
2003-04	190,082	58.27	21.70	8.41	88.38
2004-05	191,164	61.28	24.19	10.78	96.24
2005-06 (P)	192,611	66.06	27.02	12.53	105.60
2006-07 (P)	193,723	71.10	28.61	12.05	111.76
2007-08 (P)		74.43	28.47	13.61	116.51
2008-09 (P)		77.90	33.59	17.10	128.58
(P) = Provisional.					
Note : 1. Calculated on the basis of consumption figures given in Table 6.01 (a) (Part I) and gross cropped area in Table 1.01 (Part II).					
2. Figures of consumption and gross cropped area refer to the same year, except last three years, where gross cropped area is for the year 2006-07.					

2.10 Among the fertilizers, Urea accounts for 82% of total Nitrogen consumption and Di-Ammonium Phosphate (DAP) for more than 60% of phosphate consumption. 6 crops namely rice, wheat, cotton, sugarcane, rapeseed and mustard account for over two thirds of fertilizer consumption. The details of share of major crops in fertilizer consumption are **at Annexure – II D.**



2.11 The share of irrigated area (which is about 40% of gross cropped area) in fertilizer consumption is 68.5% while that of rainfed area is 31.5% .

2.12 The intensity of fertilizer consumption (NPK) varies greatly between the States: from 49 kg/hectare in Rajasthan to 240 kg./hectare in Andhra Pradesh. Punjab, Tamil Nadu and Haryana have consumption figures of 221 kg/hectare, 217 kg/hectare and 202 kg/hectare respectively (2008-09 data, source : FAI). Details are at **Annexure – II E.**

2.13 Rice - wheat is the most important cropping system in terms of area, fertilizer use and crop productivity. A look at the Indo-Gangetic plains in terms of yield and fertilizer use shows the following pattern:

Table - 6

Region	Crop	Fertilizer Use (kg/hectare)				Yield (tones/ hectare
		N	P_2O_5	K_2O	Tota1	
Lower Gangetic Plains	Rice	85.9	9.9	32.8	128.5	2.34
	Wheat	95.5	6.5	27.6	129.6	2.95
Middle Gangetic Plains	Rice	111.9	36.4	9.8	158.1	2.22
	Wheat	111.6	42.4	11.6	165.6	2.6
Trans Gangetic Plains (Haryana)	Rice	163.2	52.8	0	216	3.6
	Wheat	171.3	56.9	0	228.2	4.55
Trans Gangetic Plains (Punjab)	Rice	141.3	58.5	0	199.8	3.68
	Wheat	143.2	58.7	0	201.9	4.73
Upper Gangetic Plains	Rice	108.3	44.6	2.2	155.1	2.92
	Wheat	109.8	52.2	2.1	164.1	4.48
Indo Gangetic Plains	Rice	117.3	35.2	11.8	164.2	2.95
	Wheat	120.3	38.2	11.1	169.7	3.95
	Rice + Wheat	**237.6**	**73.4**	**22.9**	**333.9**	**6.9**

Source: FAO

2.14 The intensity of fertilizer use and the productivity of rice and wheat crops decreases from the West (Haryana & Punjab) to the East in the Indo-Gangetic plains as is seen from the above table.

2.15 It is worthwhile to look at intensity of consumption of fertilizer in some of the important countries in the World including a few of our neighboring countries. The following table shows the consumption of fertilizer in a few countries:

Table - 7

FERTILIZER CONSUMPTION			
			Kg per hectare
	2005	2006	2007
Bangladesh	196.5	191.0	191.2
China	321.7	363.3	331.1
India	**127.8**	**136.4**	**142.3**
Sri Lanka	281.0	305.6	299.3
New Zealand	1174.2	1088.0	1147.1
Brazil	139.6	145.1	190.1
USA	165.1	147.8	171.2

Source : World Bank

2.16 While comparing the intensity of the fertilizer consumption across countries, it is also appropriate to compare the cereal yields in these countries. The table below indicates the average yield of cereals in these countries.

Table - 8

Cereal yield				
				Kg/hectare
	2005	2006	2007	2008
Bangladesh	3682	3760	3956	3972
China	5226	5313	5315	5535
India	**2412**	**2456**	**2619**	**2647**
Sri Lanka	3467	3619	3822	3660
New Zealand	7401	7020	7916	7380
Brazil	2883	3211	3553	3829
USA	6452	6405	6704	6624

Source : FAO/World Bank

2.17 It is obvious that China, with a very high level of consumption of fertilizer, has achieved yields which are almost double of India's yields. Bangladesh reports a per hectare consumption higher than India's and has also been able to achieve higher yields. India's average yields tend to be low mainly on account of the low productivity regions including rainfed areas. A comparison across States indicates that fertilizer consumption in the middle and lower Gangetic plains needs to be increased to achieve higher productivity levels.

2.18 A comparison of the crop production index which is the agricultural production of all crops (except fodder) relative to the base year 1999-2001 (100) among the above mentioned countries also indicate the trend in increase of agriculture production in comparison to the increase in fertilizer

consumption. The table below compares the agricultural production index with increasing fertilizer consumption:

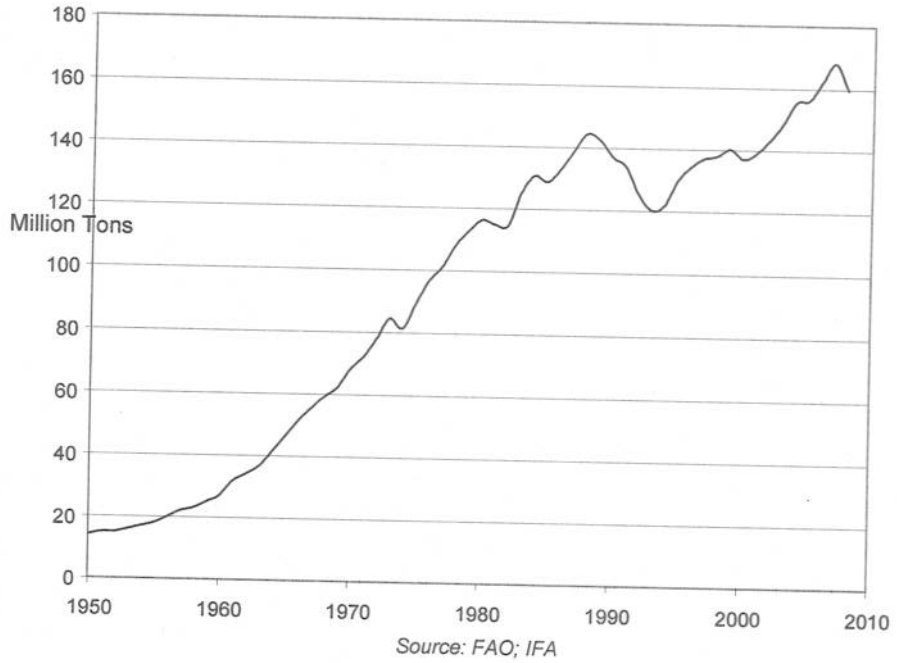
Table - 9

	2005		2006		2007	
	Fertilizer consumption	Agricultural production index	Fertilizer consumption	Agricultural production index	Fertilizer consumption	Agricultural production index
Bangladesh	196.5	115	191.0	116	191.2	114
China	321.7	118	363.3	120	331.1	123
India	**127.8**	**104**	**136.4**	**110**	**142.3**	**118**
Sri Lanka	281.0	106	305.6	108	299.3	106
New Zealand	1174.2	106	1088.0	106	1147.1	111
Brazil	139.6	125	145.1	131	190.1	141
USA	165.1	107	147.8	101	171.2	109

(Base 1999-2000 is 100)

2.19 The table above does not suggest that agricultural productivity increases in proportion to the increase in fertilizer consumption. In India's case, increased and more balanced consumption of fertilizer is necessary to increase production and productivity. Globally, the fertilizer consumption has been growing except for a small dip in the late 80's and early 90's. The graph below indicates this trend.

World Fertilizer Consumption, 1950-2008



Source: FAO; IFA

2.20 The Fertilizer Association of India (FAI) estimates the future demand for NP&K in India as follows:

Table - 10

ALL INDIA DEMAND PROJECTIONS OF FERTILIZER (NPK)

(2009-10 to 2013-14)

				('000 tonnes)
Year	N	P_2O_5	K_2O	Total
2009-10	15,570	7,030	3,000	25,600
2010-11	15,850	7,290	3,130	26,270
2011-12	16,310	7,610	3,300	27,220
2012-13	16,760	7,930	3,480	28,170
2013-14	17,220	8,270	3,670	29,160

2.21 The CAGR in the above table is 2.5% for 'N', 4.1% for 'P' and 5.1% for 'K'. FAO estimates that fertilizer demand in India will grow annually at 2.2% for Nitrogen 3.5 % for Phosphate and 4.2% for Potash. Both these trends show that consumption of Phosphate and Potash are likely to increase at a higher rate than that of Nitrogen. This trend also takes into account the rapid decrease of nutrients in the soil in agricultural lands in India. Globally however, FAO projects an annual growth of 1.5% for Nitrogen, 2.0% for Phosphate and 2.4% for Potash during the same period.

2.22 While these numbers indicate growth based on projections of increased production in India, efforts to substantially step up production of food, feed and fiber crops and introduction of new seeds and technology may demand a different set of projections not only for NPK but also for secondary and micro nutrients. A district / region specific plan of action should be the basis of any attempt at optimizing the use of fertilizers for achieving higher levels of productivity. So far most projections for assessing fertilizer demand have been based on overall past trends.

2.23 It is necessary to move to a more scientific assessment of fertilizer demand based on soil characteristics, irrigation potential, crop and seed characteristics and increase in productivity. A simple linear growth in fertilizer consumption based on past consumption data may provide comfort to State Agriculture officials, but is not scientific and does not necessarily add to productivity. This exercise of assessing fertilizer demand District wise, based on crop, seed, soil and climate should start at the earliest to avoid wastage of resources. Preparatory actions to start this process need to be initiated in consultation with ICAR and SAUs.

2.24 Use of green manure, farm yard manure (FYM) and organic fertilizers is an important element in increasing productivity of crops. While figures for production and use of these are not available for obvious reasons, there is

anecdotal evidence to suggest that use of organic manures is declining in the country. This has resulted in declining fertilizer responses and crop productivity. Scientific studies point to the need for applying organic fertilizers particularly farm yard manure and green manure in combination with chemical fertilizers to achieve optimal results. The only reliable data available relates to the production of organic fertilisers. The production figures of organic fertilizer are as follows:

Table - 11

(in MTs)

	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Total production	9798	10600	110764	16145	20111	24455

2.25 While there is encouraging growth in the production of organic fertilizers, the fact that almost two thirds of the production is confined to the two states of Karnataka and Tamil Nadu is a cause of concern. While steps have been taken to promote fertilizers, steps taken to convince farmers to use organic waste and farm yard manure in larger quantities have not been effective. In fact, competing uses of organic wastes and the costs associated with it have reduced the availability of such inputs for agriculture. Unless urgent corrective steps are taken to restore the natural balance in the soil by using organic waste as much as possible, efforts to increase productivity may not succeed to the extent desired.

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Chapter-III

NUTRIENT STATUS OF INDIAN SOILS AND FERTILIZER USE EFFICIENCY

Introduction:

3.1 Nutrient deficiencies in Indian soils have become more pronounced with the intensification of agriculture. While farmers continue to use more fertilizers per hectare in almost all the important States in the country, the fertilizer response ratios are coming down drastically. This chapter tries to analyse the current status of nutrient deficiencies for the major nutrients. It also attempts to analyse fertiliser use efficiency and suggest options for optimization of fertiliser use.

Nutrient deficiencies in soils

3.2 Improper nutrient management has led to multi-nutrient deficiencies in Indian soils. In the early sixties, when fertilizer responsive varieties were introduced in India, optimum yields could be obtained with the application of nitrogenous fertilizers alone. However, the bumper harvests soon depleted other nutrients and their deficiencies started showing up. Within a few years, Phosphorus and Zinc deficiency appeared in the Indo-Gangetic plain. There is growing evidence to increased mining of soil Potassium and more rampant decline in rice yields in Indo-Gangetic Plain from 24 research stations. The continuous use of high analysis chemical fertilizers (devoid of Sulphur impurities) has made Sulphur a limiting nutrient in many soils of the country. Today, the nutrient deficiencies at the country level are of the order of 89, 80, 50, 41, 49, 33, 13, 12, 5 and 3 % for Nitrogen, Phosphorus, Potassium, Sulphur, Zinc, Boron, Molybdenum, Iron, Manganese and Copper, respectively (Figure-1&2). The state wise status in terms of macro, secondary and micro nutrients is given below (Tables 1, 1A, 2, 3). The deficiencies are becoming more critical for Sulphur, Zinc and Boron. The limiting nutrients do not allow the full expression of other nutrients thereby lowering the fertilizer responses and crop productivity.

Table - 1

Macro-nutrient (NPK) status of Indian soils.

State / Territory	% samples								
	N			P			K		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
A & N Islands	96	3	1	96	4	0	99	0	1
Andhra Pradesh	62	21	17	57	29	14	9	30	61
Arunanchal Pradesh	0	1	99	61	38	1	9	46	45
Assam	30	44	26	27	36	38	30	46	34
Bihar	-	-	-	-	-	-	-	-	-
Goa	12	17	71	44	30	26	27	42	31
Gujarat	51	27	22	41	54	5	5	30	65
Haryana	96	4	0	81	18	1	27	41	32
Himachal Pradesh	17	32	51	36	35	29	45	47	8

Jammu & Kashmir	45	28	27	72	24	4	62	32	6
Karnataka	29	37	34	31	48	21	7	32	61
Kerala	41	52	7	18	29	53	29	44	27
Madhya Pradesh	40	41	19	39	38	23	10	32	58
Maharashtra	67	26	7	86	12	2	8	18	74
Manipur	59	32	9	76	18	6	8	81	11
Meghalaya	5	6	89	52	36	12	34	63	3
Mizoram	7	14	79	68	19	13	10	73	17
Nagaland	3	30	67	80	20	0	87	13	0
Orissa	60	23	17	59	28	13	33	41	26
Pondicherry	98	2	0	94	6	0	2	97	1
Punjab	41	51	8	29	49	22	6	48	46
Rajasthan	78	22	0	0	91	9	0	56	44
Tamil Nadu	75	16	9	24	41	35	12	36	52
Tripura	46	32	22	54	23	23	54	22	24
Uttar Pradesh	80	15	5	71	26	3	12	55	33
West Bengal	44	45	11	34	27	39	30	36	34
All India	63	26	22	43	38	20	13	37	50

Data source : Motsara (2002a) for NPK all states except Bihar and Rajasthan

3.3 The soil fertility status of 500 Districts is given below:

Table – 1-A

State	No. of Districts													
	N					P					K				
	L	M	H	NA	Total	L	M	H	NA	Total	L	M	H	NA	Total
AP	15	8			23	18	5			23		3	20		23
Assam	9	17			26	3	23			26	12	12	2		26
Bihar	10	20	1		31	11	19	1		31	8	22	1		31
Chhatisgarh	10	8			18	8	10			18	3	4	11		18
Gujarat	13	9	3		25	12	13			25		4	21		25
Haryana	18	1			19	17	2			19		9	10		19
Himachal Pradesh		5	7		12	6	5	1		12	7	5			12
Jarkhand	2	20			22	17	4	1		22		17	5		22
Karnataka	1	13	13		27	7	16	4		27	2	5	20		27
Kerala	3	10	1		14		10	4		14		12	2		14
Maharashtra	26	5			31	29	2			31	2	5	24		31
MP	14	29	5	1	49	15	28	6		49	7	15	27		49
Orissa	17	12		1	30	11	17		2	30	3	18	7	2	30
Punjab	12	5			17		8	9		17		2	15		17
Rajasthan	27	4			31	15	15		1	31		7	24		31
Tamil Nadu	28	1	1		30	5	12	13		30	1	8	21		30
UP	69	2			71	70	1			71		46	25		71
Uttarakhand	5	6	2		13	10	3			13		9	4		13
West Bengal	4	7			11	3	7	1		11	2	9			11
Total	283	182	33	2	500	257	200	40	3	500	47	212	239	2	500

3.4 283 out of 500 Districts have reported low levels of Nitrogen whereas 182 Districts have medium levels of Nitrogen in the soil thereby necessitating application of Nitrogen for each crop. The situation with regard to Phosphorous is almost the same with 257 Districts showing low level of Phosphorous and 200 Districts showing medium levels of Phosphorous. It is only in the case of Potash that the situation looks more comfortable with only 47 Districts showing low levels and 212 Districts showing medium levels. This does not mean that application of Potash needs to be discontinued. What it means is that there has to be proper calibration of application of Potash in the soil in relation to the other

nutrients. A list of districts under low/ medium/high nutrients (NPK) is at **Annexure – III A.** Maps showing the status of N,P&K in Indian soils are at **Annexure - III B.**

3.5 The real cause for concern, however, is the alarming level of deficiencies of micro and secondary nutrients in soils of India. Sulphur was found deficient in 41% of the samples analysed, Zinc in 49% of samples analysed and Boron in 33% of the samples analysed. Fertilizer responses can be improved significantly with appropriate addition of Sulphur, Zinc and Boron as the case may be, depending on the soil and the crop. The responses can be further enhanced by use of organic manures.

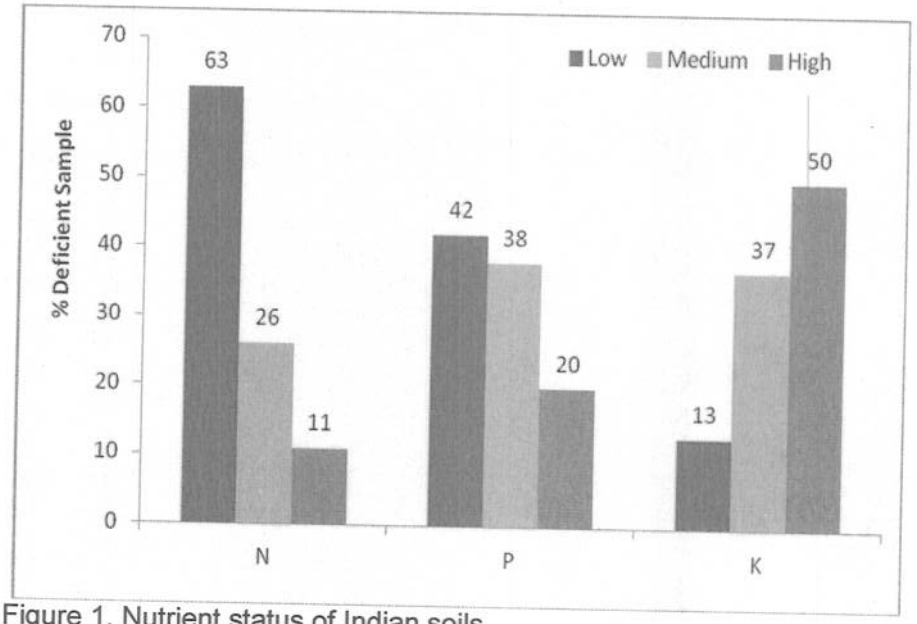

Figure 1. Nutrient status of Indian soils
Source: Motsara (2002)

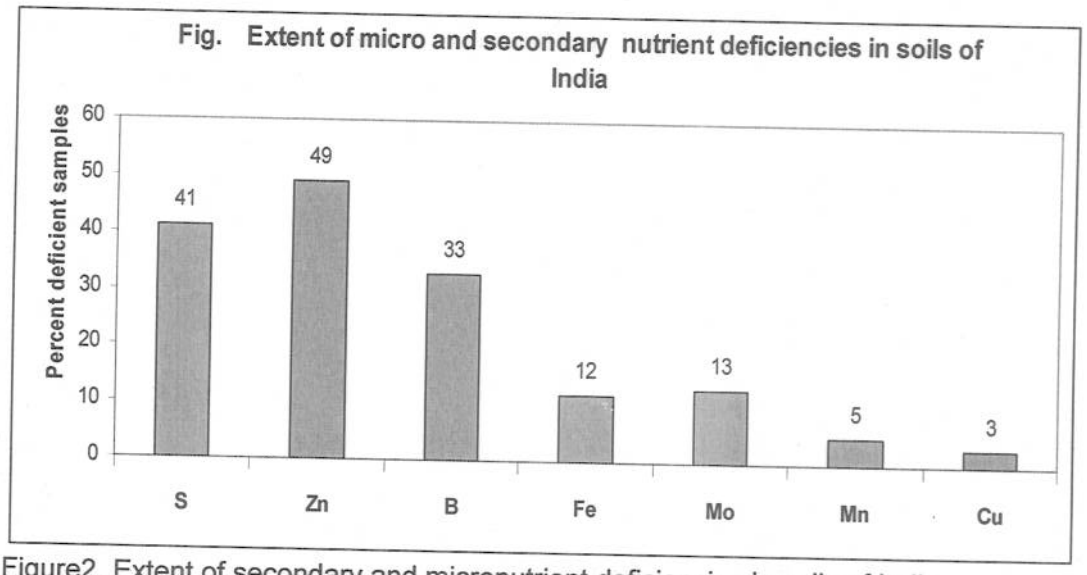

Figure2. Extent of secondary and micronutrient deficiencies in soils of India
Source: Singh, M. V. (2001 a, b)

3.6 Sulphur deficiency, as mentioned earlier, has emerged as a major problem particularly in areas where Sulphur free fertilisers like DAP, Urea etc. are continuously being used and in areas where oilseeds and pulses are being cultivated.

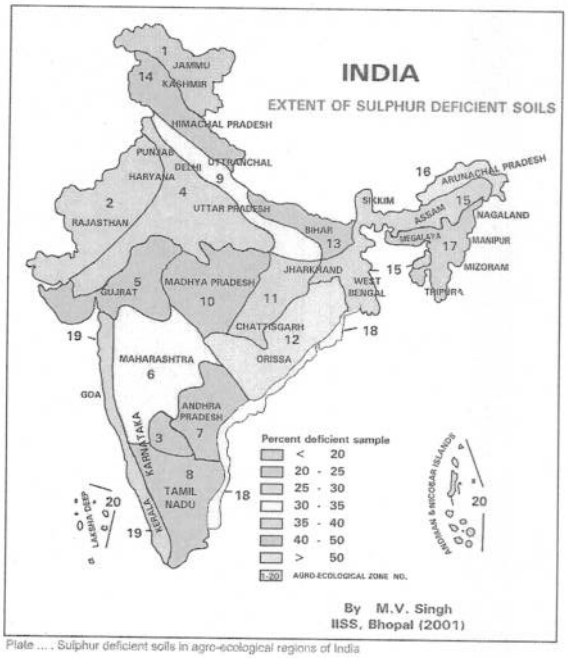

Plate ... : Sulphur deficient soils in agro-ecological regions of India

Table - 2
Extent of sulphur deficiencies in major regions/states

Region / State	No. of Samples	% samples in category		
		Low	Medium	High
Northern Region				
Uttar Pradesh	6250	49	38	13
Uttaranchal	1558	42	41	17
Haryana	1515	38	36	26
Punjab	3750	15	19	66
Himachal Pradesh	2250	84	16	0
Total	**15323**	**44**	**30**	**26**
Western Region				
Madhya Pradesh	2000	33	55	12
Chattisgarh	1492	23	38	39
Gujarat	3016	33	29	38
Maharashtra	1045	39	27	34
Rajasthan	4921	65	18	17
Total	**12474**	**45**	**30**	**25**
Eastern Region				
Bihar	600	26	30	44
Orissa	2261	21	24	55
Jharkhand	809	51	31	18
West Bengal	6438	39	36	25
Total	**10108**	**35**	**33**	**32**
Southern Region				
Andhra Pradesh	1880	56	34	10
Karnataka	1703	43	32	25
Tamil Nadu	1716	26	41	33
Kerala	5990	81	18	1
Total	**11289**	**63**	**26**	**11**
All India	**49194**	**46**	**30**	**24**

Source: Tewatia et al., 2006

Table - 3
Micro-nutrient status of Indian soils (% sample deficient)

State / Territory	sample analysed	Zn	Cu	Fe	Mn	B	Mo
Andhra Pradesh	8158	49	<1	3	1	-	-
Assam	12165	34	<1	2	20	17	-
Bihar	19214	54	3	6	2	38	-
Gujarat	30152	24	4	8	4	2	10
Haryana	21848	61	2	20	4	0	28
Himachal Pradesh	6155	42	0	27	5	-	-
Jammu & Kashmir	93	12	-	-	-	-	-
Karnataka	27860	73	5	35	17	32	-
Kerala	650	34	3	<1	0	-	-
Madhya Pradesh	32867	44	<1	7	1	22	18
Maharashtra	515	86	0	24	0	-	-
Meghalaya	95	57	2	0	23	-	-
Orissa	16040	54	-	0	0	69	-
Pondicherry	4108	8	4	2	3	-	-
Punjab	16483	48	1	14	2	13	-
Rajasthan	183	21	-	-	-	-	-
Tamil Nadu	28087	58	6	17	6	21	-
Uttar Pradesh	26126	46	1	6	3	24	-
West Bengal	6547	36	0	0	3	68	-
All India	251373	49	3	12	5	33	13

Source ; Singh (2000,2001a,b)

3.7 While about 130 districts were deficient in sulphur in 90s, the number today is over 240. As per studies by TSI-FAI-IFA Sulphur Project (1997-2006) across 18 states in the country, the soil available 'S' was deficient in 46 % samples and potentially deficient in another 30 %. The 'S' deficiencies showing up in all parts of the country were more rampant in the southern region. The States found most deficient in 'S' were Himachal Pradesh (84 %), Kerala (81%), Rajasthan (65%), Andhra Pradesh (56%) and Jharkhand (51%). Sulphur deficiency has been frequently observed in wheat in coarse textured soils of Punjab. The deficiencies could be of the order of 40-45 % of Districts covering about 60 million ha of net sown area. The 'S' deficiency is becoming a major constraint in sustaining optimum yields of cereals, oilseeds and pulses.

3.8 A good response to the application of 'S' has been obtained for large number of crops and cropping systems in field trials at about 90 sites in 18 States under TSI-FAI-IFA Sulphur Project . The yield increases were of the order of 14-55 % for cereals (rice, wheat, maize, pearl millet, sorghum), 17-68 % for pulses (pea, cowpea, mungbean, urdbean, clusterbean), 18-60 % for oilseeds (soybean, groundnut, sunflower, mustard) and 28-72 % for vegetables (potato, cabbage, garlic, onion). The residual effect of 'S' was also significant on the succeeding crops. The application of 'S' was found to be remunerative for farmers. Similarly, the yield response of oilseeds and pulses to 'S' fertilization in large number of frontline demonstrations conducted under AICRP on Micronutrients of ICAR were very encouraging (Table 4).

Table - 4

Response of oilseeds and pulses to Sulphur fertilization in front line demonstrations

Crop	No. of trials	Seed yield, kg ha^{-1}		Response over NPK	
		NPK	NPK+S	Kg grain /kg S	Percent
Oil seeds					
Groundnut	6	1425	1783	9.0	9.9
Gobhi sarson	2	1443	1980	13.5	13.4
Mustard	6	1487	2158	16.8	21.6
Raya	11	1435	1983	13.7	13.7
Soybean	2	1230	1950	18.0	18.0
All oil seeds	27	1430	1975	13.6	14.9
Pulses					
Chickpea	21	1623	2017	9.9	26.7
Green gram	11	809	976	4.2	21.7
Lentil	10	1342	1576	5.9	17.5
Black gram	8	816	975	4.0	19.5
Pigeon pea	9	1209	1464	6.4	21.2
All pulses	59	1251	1522	6.8	22.9
Total	**86**	**1307**	**1664**	**8.94**	**20.4**

Source: Singh, M. V. (2001b)

3.9 Zinc deficiency is rampant in the alluvial soils of Indo-Gangetic plains, black soils of Deccan Plateau and red and other associated soils. The deficiencies were to the extent of 86 and 73 percent in Maharashtra and Karnataka, respectively. There was significant response to the application of 'Zn' in cereals and oilseeds and pulses as seen under a large number of experiments on cultivators' fields (Tables 5,6). The continuous application of 'Zn' has resulted in the build-up of 'Zn' in soils of northern states of India. Such a situation would demand a review of the fertilization schedules of 'Zn' fertilizers to soils and crops.

Table - 5

Mean response to Zinc application over NPK in experiments on cultivator's fields.

Crop	No. of Experi-ments	Grain yield in NPK, kg/ha	Mean grain response over NPK		
			% increase	kg grain/ ha	kg grain/ kg Zn
Rice	1252	3483	6.3	219	39.9
Wheat	5172	2353	8.8	208	37.8
Maize	601	2987	7.6	226	41.1
Barley	209	2734	9.3	254	46.2
Over all	**7234**	**2612**	**8.3**	**213**	**38.7**

Source: Singh, M. V. (2001c)

Table - 6
Response of oilseeds and pulses Zinc fertilization over NPK in front line demonstrations

Crop	No. of field Exps.	Seed yield, kg/ha		Response over NPK	
		NPK	NPK+Zn	kg grain / kg Zn added	Percent
Soybean	24	1109	1248	27.8	12.5
Ground nut	30	1509	1713	40.8	13.5
Gobhisarson	9	1595	1842	49.4	15.7
Linseed	2	1064	1316	30.4	13.8
Mustard	6	1352	1832	96.0	37.6
Raya	8	1499	2177	135.8	48.2
Sunflower	2	1610	2230	124.0	41.6
Cotton	27	1151	1370	44.0	14.5
All oil seed	108	1322	1578	50.1	18.2

Source: Singh, M. V. (2002)

3.10 Boron deficiency is found in red and lateritic, acidic, coarse textured alluvial and highly calcareous soils. It is becoming more widespread in Orissa, West Bengal and Bihar. A significant response to the application of Boron with an average increase of 24 % in yields over NPK has been obtained in large number of field trials on different crops (Table 7).

Table - 7
Crop response to Boron fertilization in field trials conducted on different soils.

Crop	No. of trials	kg grain /kg boron added	Per cent response over NPK
Rice	107	384	16.6
Wheat	35	468	15.1
Maize	5	684	32.5
Chickpea	7	420	44.1
Lentil	4	298	18.6
Groundnut	11	144	9.9
Sesame	5	108	23.9
Mustard	15	320	32.8
Sunflower	3	660	35.2
Cotton	2	312	11.6
Average	194	**380**	**24**

Source: Singh, M. V. (2006)

Periodic change in fertility status of Indian soils:

3.11 The continuous application of P and Zn has resulted in their build-up in soils of Punjab and the northern states of India, respectively (Figures 3,4). The available P increased from about 20 kg ha^{-1} in 1981-82 to 29 kg ha^{-1} in 2005-06. This is not to suggest a discontinuation of application of P & Zn, but to underline the need for continuous review of soil conditions and adjustment of the composition of recommended nutrients. A continuous monitoring of soil nutrient status is required to optimize the fertilizer usage and achieve better nutrient efficiency. Considering practical deficiencies and the cost involved, the recommendation is to update the soil nutrient data and maps at least every 3 -5 years.

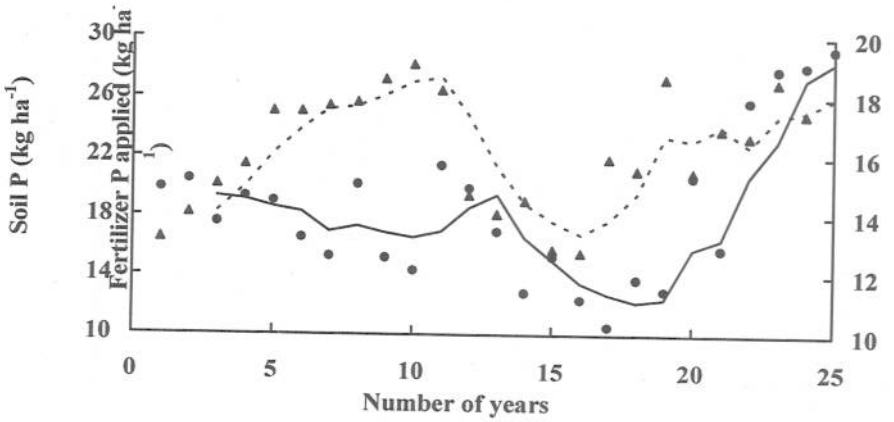

Figure 3. Changes in weighted average of soil P status as compared to fertilizer 'P' applied (kg ha^{-1}) during the period 1981/82 to 2005/06. The lines indicate 3-years moving average
Source: **Benbi and Brar (2009)**

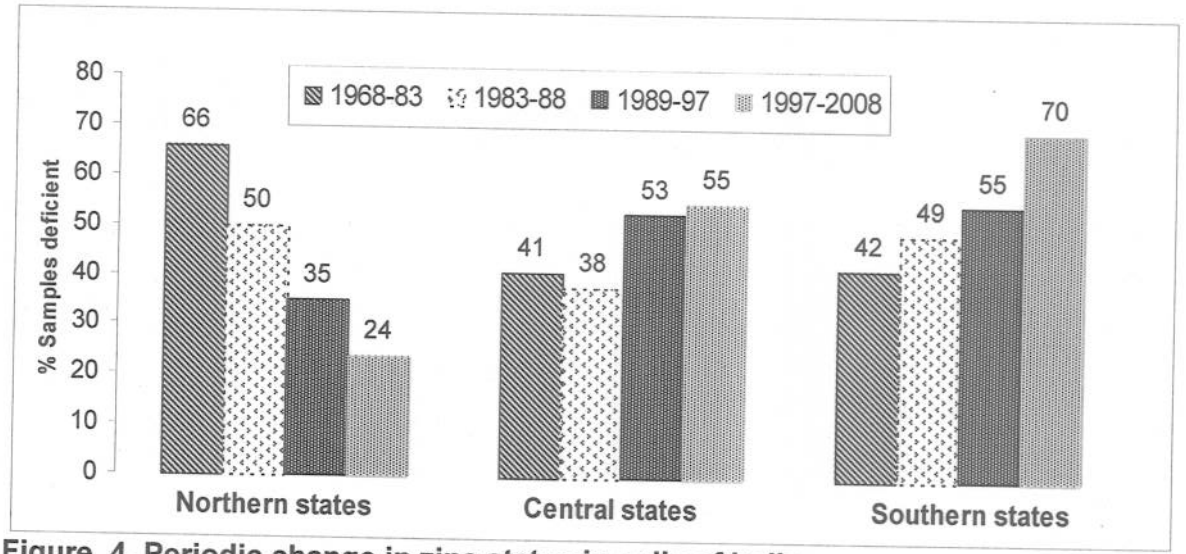

Figure 4. Periodic change in zinc status in soils of India
Source: **Singh et al (2009)**

Integrated plant nutrient system:

3.12 The system entailing conjunctive use of nutrients through chemical, organic and bio fertilizers is panacea for good soil health, enhancing nutrient-use efficiency, increasing yields and reducing cost of cultivation. The usefulness of the system has been demonstrated by the ICAR All India Coordinated Research Project on Long Term Fertilizer Experiments running since 1970-71. The application of 'N' alone caused reduction in response ratio from initial 12.5 to 5 over 30 years primarily due to deficiency of 'P' and 'K' (Figure 5). The response ratio increased with the application of 'P' along with 'N', but its reduction with time was again conspicuous in the absence of 'K' application. The ratio got stabilized at a higher level only with the balanced application of NPK. Any further appreciation in the response ratio beyond this level could not be relied merely with the application of higher dozes of chemical fertilizers. The response ratios appreciated with a rising trend only when chemical fertilizers were supplemented with organic manure. The average response ratios of N, NP, NPK and NPK+FYM were 8.1, 10.1, 12.8 and 15.2 kg grain/kg nutrient, respectively (Figure 6). The site specific nutrient management meeting requirements of all primary, secondary and micronutrients at 10 locations in northern part of the country, has given an average annual grain productivity of 13.3 t ha^{-1} of irrigated rice-wheat.

3.13 ***The liming of acidic soils with pH<5.5 has a great promise in improving the nutrient use efficiency, productivity and profitability. The effect is more pronounced on pulses and oilseeds. The practice may effect saving of fertilizers by about 50 percent (Table 8). As marketable lime is costly, we may utilize large quantities of paper mill sludge and basic slag available as by-product with paper mills and steel industries, respectively. These cheap and effective lime sources need to be made available to the farmers after minor processing and bagging etc. The State Governments need to facilitate agreements/tie ups with the concerned industries for the sustained supplies of liming materials. The intervention on 12 million ha of highly acidic soils could add 12 million tonnes of grain to the food basket per annum.***

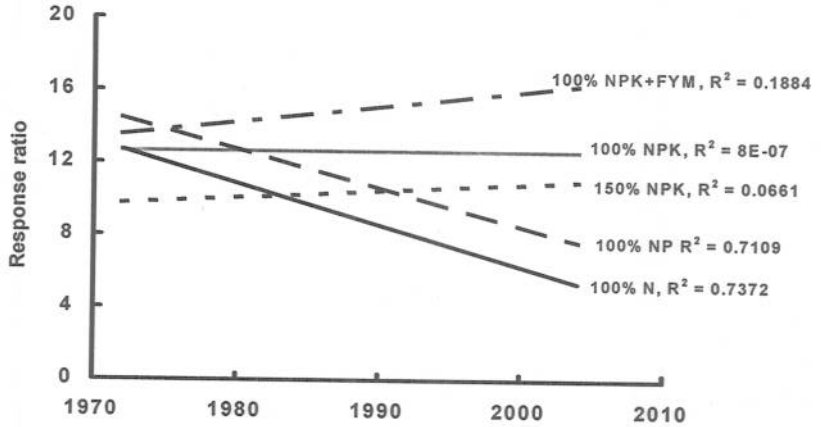

Figure 5. Nutrient response (kg grain/kg nutrient) in cereals (Source : LTFE data, 1972-2003)

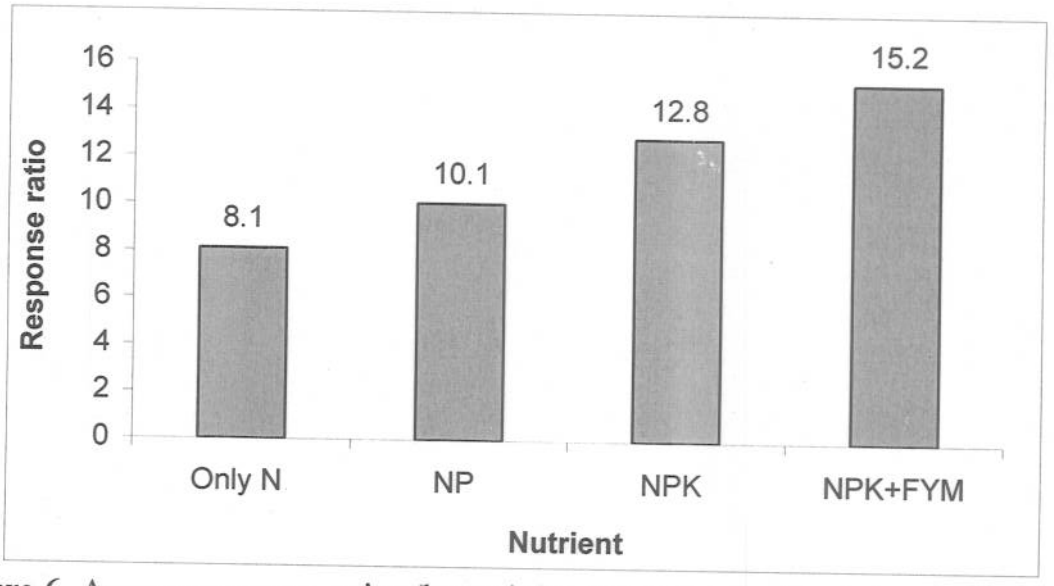

Figure 6. Average response ratios (kg grain/kg nutrient) of nutrients in cereals (LTFE data, 1972-2003).

Table - 8

Yield (q ha^{-1}) of crops in acid soils of different States with recommended fertilizer dose (100% NPK) & with half the recommended dose with lime (50% NPK + lime)

State	Crop	Rec. NPK	50% NPK +Lime	Yield difference with 50% NPK + lime (+) / (-)
Assam	Rapeseed	9.70	10.10	+0.30
	Summer green gram	4.42	5.17	+0.75
Kerala	Cowpea	8.57	10.65	+1.08
	Black gram	6.38	8.10	+1.72
Meghalaya	Maize	30.50	30.30	-0.20
	Groundnut	14.20	21.30	+ 7.10
West Bengal	Mustard	8.15	8.40	+0.25
	Wheat	16.70	17.15	+0.45
Jharkhand	Maize + Pigeon pea (Maize equiv. yield)	69.0	65.0	-4.00
	Pea	38.4	50.8	+12.40
Orissa	Groundnut	22.5	23.6	+1.10
	Pigeon pea	12.0	12.2	+0.20

Source: Sharma and Sarkar (2005)

Declining fertilizer responses

3.14 The declining fertilizer responses and crop productivity since 70s are a matter of great concern. The fertilizer response ratio in irrigated areas of the country has decreased nearly three times from 13.4 kg grain / kg nutrient in 1970 to 3.7 kg grain /kg nutrient in 2005 (Fig. 7). While only 54 kg /ha NPK was required to produce around 2 t/ha in 1970, around 218 kg/ha are being added presently to sustain the same yield (Fig 8). ***The impaired soil health due to imbalanced fertilizer use coupled with less use of organic manures is responsible for declining fertilizer responses and crop productivity.*** The

soils are not being adequately replenished even with the macro nutrients in the correct order and magnitude, let alone secondary and micro nutrients.

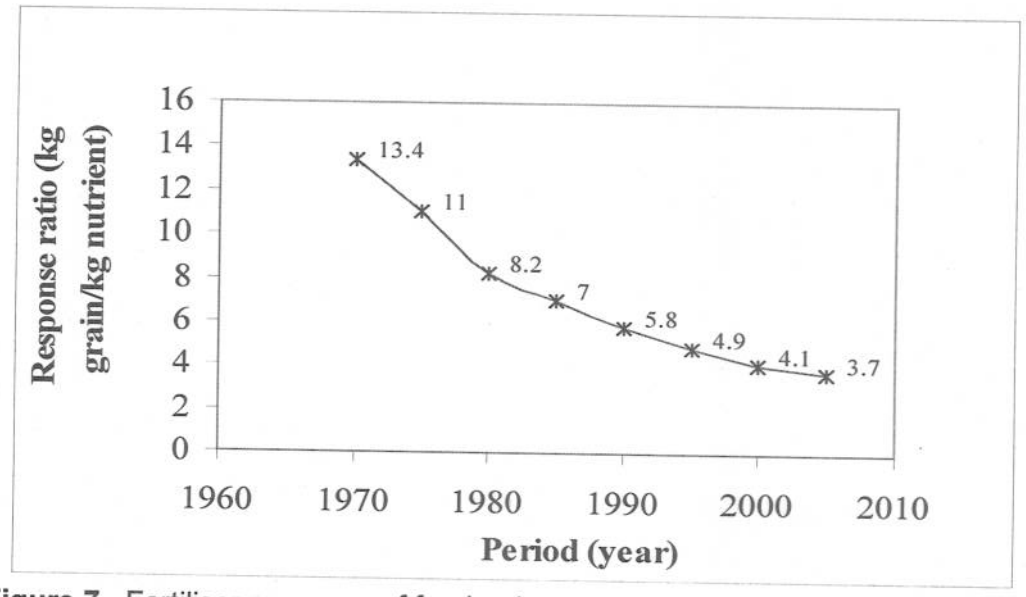

Figure 7. Fertiliser response of foodgrain crops in irrigated areas in India (Source: Biswas and Sharma 2008)

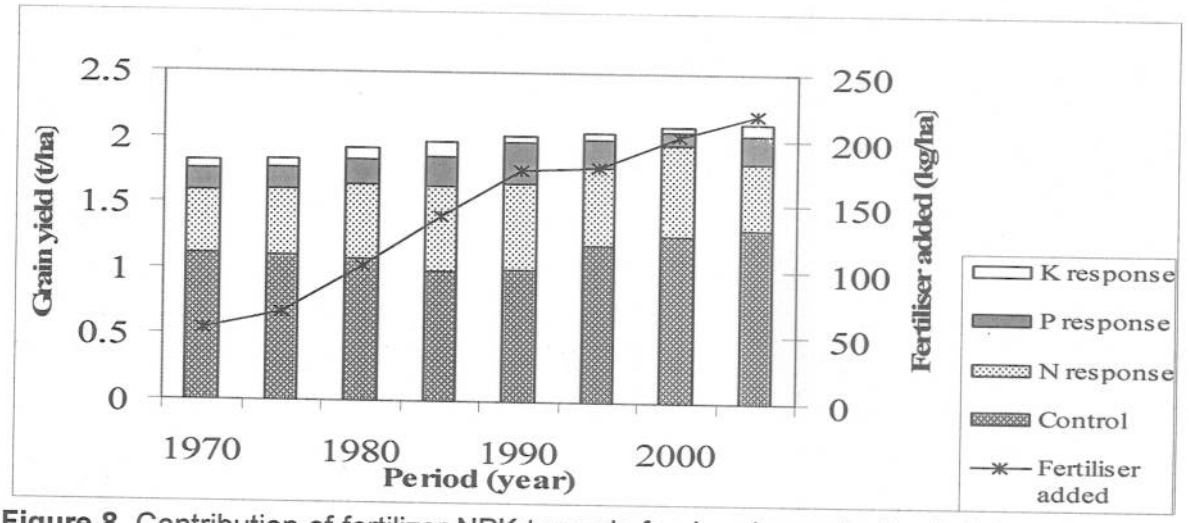

Figure 8. Contribution of fertilizer NPK towards food grain production in irrigated areas in India. (Source: Biswas and Sharma 2008)

3.15 To arrest the decline in response ratio and to improve productivity, it is necessary to move towards a site specific nutrient (integrated) management strategy (SSNM) taking into consideration the crops that are grown in the region. While these would normally be based on agro-ecological zones (20) and sub agro ecological zones (60), it is considered appropriate from an operational and administrative point of view to adopt district as the base for such planning. It is possible to combine one or more Districts in one plan based on soil status, area of the district and crops. China, which has recorded high

productivity increases, has managed to do this partly on account of focus on SSNM. It is admitted that it is not possible to shift to the SSNM model within one year but a beginning needs to be made with the clear plan of action at least for those 100 districts (**Annexure – III C**) which account for roughly 50% of the total consumption of fertilizers in the country.

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Chapter - IV

STATUS OF SOIL TESTING IN THE COUNTRY

4.1 The country has 541 Static Soil Testing Laboratories (STLs) and 120 Mobile Soil Testing Laboratories (MSTLs). Of these, 521 static laboratories and 105 mobile laboratories are with the State Governments and 19 static and 15 mobile owned and operated by the fertilizer industry. These 661 laboratories have an annual capacity of testing 72 lakhs samples in a year. However, most of these laboratories suffer from one or more of the following handicaps:

a) They can test samples only for NPK and can not test for secondary / micro nutrients.

b) Most of the State Government owned laboratories do not have adequately qualified man-power thereby affecting the quality of soil tests.

c) The system of collecting soil samples and disseminating information is inefficient and time consuming.

4.2 In spite of these constraints, many of the laboratories have stepped up their performance and managed to test 61 lakh samples in 2008-09. There are, however, questions about the reliability of these tests particularly in States where qualified manpower is not available.

4.3 A detailed statement showing Statewise availability of soil testing laboratories and the number of samples analyzed in 2008-09 are at **Annexure - IVA.** The Fertilizer Industry has analysed 4.62 lakh samples during 2008-09. Out of this 1.07 lakh samples were analysed in Gujarat alone.

4.4 In terms of the total number of samples analyzed, six States namely Uttar Pradesh, Punjab, Rajasthan, Gujarat, Tamil Nadu and Andhra Pradesh account for 71% of the samples analyzed. The other States have either under performed or have inadequate capacity to analyze samples.

4.5 The Ministry of Agriculture, realizing the necessity of strengthening the soil testing facility in the country launched a new scheme called the "National Project on Management of Soil Health and Fertility". The scheme envisages, inter-alia, the following:

a. Strengthening of Soil Testing Laboratories (STLs)

i. Setting up 500 new Soil Testing Laboratories during 11th Five Year Plan period and 250 Mobile Soil Testing Laboratories (MSTLs) for micro nutrients analysis;

ii. Strengthening of 315 existing State STLs for micronutrient analysis;

iii. Capacity building through training of STL staff/extension officers/farmers and field demonstration/ workshop etc.;

iv. Creation of data-bank for balanced use of fertilizers, which is site specific;

v. Preparation of Digital District Soil Maps (using Global Positioning System) and soil fertility monitoring system by ICAR/ State Agriculture Universities (SAUs).

b. Promoting Use of Integrated Nutrient Management

i. Promotion of organic manuring;

ii. Promotion of soil amendments (lime/basic slag) in acidic soils;

iii. Promotion and distribution of micro-nutrients.

c. Strengthening of Fertilizer Quality Control Laboratories

i. Strengthening/up-grading 63 existing State Fertilizer Quality Control Laboratories;

ii. Setting up of 20 New Fertilizer Quality Control Laboratories by State Governments.

iii. Setting up of 50 fertilizer testing laboratories for advisory purposes, under the private / cooperative sector.

4.6 The scheme has been approved for implementation during the five year plan with a total outlay of 429.85 crores for various components as listed in **Annexure - IV B .**

4.7 The broad objectives of the scheme are as follows:

i. To facilitate and promote Integrated Nutrient Management (INM) through judicious use of chemical fertilizers, including secondary and micro nutrients, in conjunction with organic manures and bio-fertilizers, for improving soil health and its productivity;

ii. To strengthen soil testing facilities and provide soil test based recommendations to farmers for improving soil fertility and economic return to farmers;

iii. To improve soil health through green manuring;

iv. To facilitate and promote use of soil amendments for reclamation of acidic / alkaline soils for improving their fertility and crop productivity;

v. To promote use of micro nutrients for improving efficiency of fertilizer use;

vi. To upgrade the skill and knowledge of STL / extension staff and farmers and their capacity building through training and demonstration including demonstration on farmers fields regarding benefits of balanced use of fertilizers;

vii. To ensure quality control of fertilizers through strengthening of fertilizer quality control facility including training to enforcement officers of State Government for effective implementation of "Fertilizer Control Order";

viii. To provide financial assistance for upgrading and setting up of STLs / Fertilizer Testing Laboratories and various activities for promoting balanced use of fertilizers.

4.8 A salient feature of the scheme is that it allows soil testing and fertilizer testing laboratories to be set up and operated in the public – private – partnership mode through Agri clinics, fertilizer industry, NGOs, Cooperatives, Private entrepreneurs etc. in addition to State Governments, ICAR and State Agricultural Universities.

4.9 Another significant feature of this programme is that it takes care of equipments required for testing secondary and micro nutrients.

4.10 The scheme provides for capacity building to train soil testing technicians and farmers. It also provides for field demonstration for balanced use of fertilizers. The programme envisages the creation of a data bank for site specific nutrient management and for preparation of 500 Digital District Soil Maps and Global Positioning System (GPS) based Soil Fertility Monitoring. In addition provisions have been made for promoting use of organic manure, use of lime/ basic slag for reclamation of acidic soil and for use of micro nutrients.

4.11 However, the progress in this regard has not been as expected. The progress till August 2010 has been as follows:

Physical & Financial Status of the Scheme NPMSF

New Static STLs (Nos)	New Mobile STLs (Nos.)	Strengthening of existing STLs (Nos)	New FQCLs (Nos)	Strengthening of existing FQCLs (Nos)
114	111	152	13	38

4.12 Some of the State Governments have prepared soil fertility maps for their use. Though they are not digital/ GPS assisted maps, these are useful for

planning fertilizer use in these areas. However, most of these maps are based on 10 year old data and are restricted to the availability of three nutrients N, P & K. While this information is useful, it is not complete enough to move towards more balanced use of fertilizers.

4.13 Indian Institute of Soil Science, Bhopal has been sanctioned an amount of Rs.10.32 crore under National Project on Management of Soil Health & Fertility and the 1st installment amounting to Rs.3.87 crore has been already released for preparation of Geo-Referenced Soil Fertility Maps including interlinking of soil fertility status with Soil Test Crop Response (STCR) data to generate site specific recommendations in 19 major States (171 Districts). IISS, Bhopal has already collected GPS based soil samples in 22 Districts and analysis of samples is in progress. The final results of all 171 Districts will be available by the end of 11th Plan period (March 2012). These maps are available on the Website of Indian Institute of Soil Sciences at www.iiss.nic.in.

4.14 While different agencies are collecting soil samples and analyzing them, it appears that these results are being used in isolation by the respective agencies. (State Governments, SAUs and ICAR have a coordination mechanism) It is important to create a common platform where all available data on soil health can be captured and digitized.

4.15 The appropriate agency to take technical leadership in this regard is ICAR, who, with support from State Agricultural Universities and State Directorates of Agriculture, can create digital maps for each District or block as the case may be. Data collected by fertilizer companies can also be incorporated into these maps subject to the technical parameters and the protocol for testing are same as those in State / SAU laboratories. Fertilizer companies are willing to share the data.

4.16 Many State Governments are trying to provide soil health cards to all farmers. While this is a laudable objective, most States will not be able to do this in a short span of time. Even if they do, updating soil nutrient status once every three / five years will be difficult. Therefore, a pragmatic option is to get a minimum number of samples from each village (preferably in a GPS assisted mode) and prepare village soil fertility maps covering primarily the following nutrients: Nitrogen, Phosphorous, Potash, Sulphur, Zinc and Boron (other nutrients may be tested on 'need' or 'deficiency' basis).

4.17 District level digitized maps should be the first step followed by Tehsil / Block maps. The data/ maps should be available in the public domain, so that farmers are able to understand the need for better balancing of fertilizers. This would also be an incentive to fertilizer companies to move faster towards production of customized fertilizers.

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Chapter - V

VIEWS OF STATE GOVERNMENTS

Representatives of large States (20) with high fertilizer consumption were asked to submit their views and explain the position vis-a-vis use of fertilizer and increase in productivity in their respective States. 12 States responded with a brief analysis of the status in their States and their views on the subject. These are summarized below:

5. 1 ANDHRA PRADESH

(i) Andhra Pradesh is one of the highest fertilizers consuming States in the country. It accounts for about 11-13% of the country's fertilizer consumption. It has the highest per hectare consumption of fertilizer in the country. Their consumption of NPK is as follows:

Year	In LMTs				In Ratio		
	N	P	K	**Total**	N	P	K
2005-06	15.22	6.90	3.40	**25.52**	4	2	1
2008-09	17.21	8.62	5.03	**30.86**	3	2	1

(ii) The NPK ratios are close to the recommendations of ICAR. However, in some of the Districts where commercial crops are cultivated, the average consumption and the ratios are higher than that of the State average.

(iii) The State has 84 soil testing laboratories comprising 2 regional soil testing laboratories, 22 District STLs, 4 mobile STLs and 56 Mini Soil Testing Laboratories at the Agricultural Market Committee level.

(iv) Analysis of soil samples over the last five years show that while 'N' remains "low" 'P' remains "medium to high" and 'K' remains at "high" level. In the case of micro nutrients Zinc is the most deficient in the soil. Progress has however been achieved in reducing Zinc deficiency.

Year	Samples analysed	Nitrogen (N)			Phosphorus (P)			Potassium (K)		
		L	M	H	L	M	H	L	M	H
2002-03	321907	69	17	15	46	33	21	14	29	57
2008-09	415390	67	21	12	22	41	37	7	25	67

(v) 36 lakh soil health cards have been distributed till date, out of which 13 lakh cards were distributed during the last three years.

(vi) ***The soil analysis data is available on-line to facilitate the farmer to plan his fertilizer application according to the soil health status.***

(vii) ***The State has an innovative scheme of painting the soil fertility index maps in a common facility with each revenue village. Though these are confined to NPK, it does give an idea to the farmer as to which nutrient needs to be strengthened in his village.***

5.1.1 Suggestions:

- Integrated Nutrient Management concepts - (Use of organic manures, crop residues, Green manures, bio-fertilizers, cheap nutrient supplying minerals acidulated rock phosphate in alkaline, pyrites for calcareous soils as a source of Sulphur). Soil amendments in combination with the chemical fertilizers will enhance fertilizer use efficiency.

- Fertilizer assessment and usage based on soil test data will ensure optimum fertilizer usage. To achieve this, soil test data for all the farm holdings should be available. In order to cover all the farm holdings in the Country/ State, the fertilizer industry should also be involved to supplement the efforts of the State Department and augment analysis capacity of the State soil testing laboratories;

- The current NBS policy provides additional subsidy to the manufacturers of fortified fertilizers. This needs to be encouraged in a big way, as the fertilizer use dominated by N, P & K nutrients resulted in deficiency of micro and secondary nutrients.

- The present use of organic manures is not sufficient to undo the damage caused to soil health over the years. This should be taken up in a mission mode;

- Display / Painting of soil fertility maps on village black boards so that farmers would know the fertility status and apply fertilizer accordingly;

- Making the fertilizers available to the farmer on production of soil health cards containing fertilizer recommendations or advisory and extent based on the nutrient status of his fields. This should be on the lines of drugs sold by Pharmacists only on production of Doctor's prescription;

- Customized fertilizer manufacture should be promoted in a big way to rationalize the present fertilizer use;

- Strengthening of Research and extension efforts in this area by University / State Departments / Fertilizer Industry and other organizations.

5.2 ASSAM

No suggestions made.

5.3 BIHAR

(i) The fertilizer consumption in Bihar is as follows:-

Nutrient	2003-04	2008-09
Total NPK (000 MT)	695.12	1386.88
NPK ratio	24.28:1.78:1	5.66:1.52:1
Consumption (kg/ha)	87.47	170.76

(ii) Bihar had wide spread deficiency of Zinc, Sulphur and Boron.

(iii) Bihar also has about 12 lakh hectares of acidic soil and about 4.5 lakh hectares affected by salt.

(iv) 22 soil testing laboratories at the Districts level and one at the State level are functioning at present. 16 STLs and 7 mobile STLs are under implementations

5.3.1 Suggestions:

- Though India has made advances in research in agriculture, but still blanket recommendation of fertilizer over large area are in vogue. The blanket recommendations are no more valuable to enhance the productivity. Now, is the time to follow the precision nutrient management for giving fertilizer schedule for which required mapping for soil fertility for particular area is necessary. Site specific Nutrient Management should be initiated and encouraged

- **Nutrient management in cropping system**: Management of nutrient on basis of cropping system should be practiced. It has following advantage (a) saving of P&K, (b) the crop effect ('N' fixation by legume and leaf fall) and (c) It can provide a basis for integrated use of organic and inorganic source of nutrient.

- **Increasing fertilizer use efficiency**: Attempt should be made to increase the FUE. This can be accompanied by (a) Product strategy-slow release fertilizer materials like coated fertilizer, slow release fertilizer and nitrification inhibitor should be made available to the farmer for enhancing FUE; and (b) Management strategy-improved methods of fertiliser application, split application of fertilizer, assessing the nutrient need based on soil test should be made available to the farmers.

- Need to develop new fertilizer management strategy in the context of modified planting technique (Paired row, deep trench etc,), irrigation methods (skip furrow, deep irrigation etc.), special soil (water logged,

saline, alkaline and acid soil), crop environment (drought, frost, flood) with a view to improving fertiliser use efficiency.

- ❖ Development of ideal fertiliser schedule (application time, method, type) for specific group of new verities (early, medium, long duration) to harness the potentiality of different agro-climatic zone should be made;

5.4 CHHATTISGARH

(i) The nutrient status of Chhattisgarh is as follows:

Total No. of sample analysed	N			P			K		
	L %	M %	H %	L %	M %	H %	L %	M %	H %
58587	56	35	9	63	29	8	34	48	18

(ii) The status of nutrient use is as follows:

(000' MTs)

Year	N	P	K	Total	Nutrients consumption (kg/ha)
Kharif 2006	218.03	86.68	35.84	340.55	71
Kharif 2009	259.36	136.56	45.07	440.98	95

(iii) Soil health card distribution during the last 4 years has been 1.74 lakh.

Period	NPK	Micro	Total
2007 - 2010	167847	6976	174823

5.5 GUJARAT

(i) The fertiliser consumption and NPK ratio for Gujarat are as follows:

Fertiliser consumption (Lakh MTs)					
Year	**N**	**P**	**K**	**Total**	**N:P:K ratio**
2006-07	9.27	3.61	1.20	14.09	7.72: 3.01: 1.00
2008-09	10.69	4.65	1.82	17.17	5.87: 2.55: 1.00

(ii) The Gujarat Government has embarked on a programme of giving soil health cards to all the farmers. So far 37 lakh samples have been taken from farmers out of 42 lakh farmers. Their plan is to provide all farmers with a soil health card. The soil health card application software is available on online data entry and access. The Taluka and District level agricultural offices have access to these data.

(iii) One of the innovative initiatives that Gujarat Government has taken is to bring the APMCs to set up soil testing laboratories and help the farmers. Government has also used PPP model effectively to

do soil testing. Volunteers in the village are trained to collect soil samples and are paid an honorarium per sample analysed.

(iv) ***The Gujarat 'Krishi Mohotsav' is an innovative example of agricultural extension services in which soil testing and package of practices are major components.***

5.5.1 Suggestions:

- Free seed must be given for green manure to encourage farmers to use these.
- Customized fertilizers should be promoted preferably through a separate budget line in the Department of Agriculture.
- Organic farming is costly business. Initial production loss and marketing of organic produce is the hurdle in organic farming. For promotion of organic farming, private companies should enter into contract farming;
- Fertilizer companies should organize massive campaigns for promoting balanced use of fertilizer in collaboration with Department of Agriculture during Kharif and Rabi.

5.6 HARYANA

(i) The fertilizer consumption pattern of Haryana is given in the table below:

Year	Fertilizer Consumption (Nutrients in 000' MTs)				Kg/Ha
	Kharif	Rabi	Total	Increase (%)	
1966-67	5	8	13	--	2.90
1976-77	53	66	119	792.29	22.55
1986-87	144	270	414	248.32	73.27
1996-97	281	479	761	83.55	125.34
2006-07	434	690	1124	47.73	173.07
2007-08	502	722	1225	8.89	187.60
2008-09	553	735	1289	5.23	199.87

(ii) The NPK ratios have improved but are still in a very high range as is made out from the table below:

Year	Fertilizer Consumption (in 000' MTs)			Total (in 000'MTs)	Ratio		
	N	P	K		N	P	K
2001-02	742	232	9	983	76	24	1
2008-09	946	313	29	1289	32	11	1

(iii) The State has 30 Static Soil Testing Labs and one Mobile Testing Lab. Out of the 30 STLs, the facility of testing micro nutrients is available only in 13. 4 new static STLs two mobile STLs and strengthening of 5 STLs have also been taken up. ***One mobile STL is being implemented under the PPP mode.***

(iv) About 7 lakh soil health cards have been distributed to farmers. The remaining 7.76 lakh cards are expected to be distributed within the next three years.

(v) District-wise GIS Soil Fertility Maps depicting village level data have been prepared.

5.6.1 Suggestions:

- In order to decrease the use of Urea, LCC (Leaf Colour Chart) technique may be introduced by which 25% quantity of Urea can be saved and split doses will improve the efficiency of urea;
- About 98% soil is low in organic carbon content (<0.4%), out of which 40-50% soil has 0-0.2% OC but the recommendation of urea is same upto 0.4%. It needs to be further categorized as extremely low, very low & low which will also arrest the excess use of Urea;
- Single Super Phosphate 14% (Granulated) and Phospho-gypsum may be included in the ambit of FCO, 1985;
- Integrated use of fertilizers and manures need to be encouraged by promotion of legumes, green manuring, FYM, vermin compost, biogas slurry, bio-fertilizers etc.

5.7 KARNATAKA

(i) The fertilizer consumption is increasing in Karnataka primarily due to crop diversification from agricultural crops to horticultural corps and increase in area under hybrid Maize, Bt cotton and pulse crops.

(ii) The NPK ratio varies from 2:1:1 to 3:2:1

Years	NPK consumption (in 000'MTs)			Total	NPK ratio		
	N	P	K		N	P	K
2005-06	754	435	335	1524	2.25	1.30	1.00
2008-09	864	558	408	1831	2.11	1.37	1.00

(iii) The State has 21 Soil Testing Laboratories with an annual analyzing capacity of 1.75 lakh samples. 14 of these laboratories can analyze micro nutrient as well. All these laboratories are equipped with

computers and "Bhoophala" software which can generate soil health cards. The analysis of soils in Karnataka shows the following:

- Low to medium in organic carbon
- Medium to high in Phosphorus
- High in Potash
- Sulphur, Zinc and Boron deficiencies have increased.

(iv) 15 Districts have been able to prepare nutrient maps for NPK, Sulphur, Zinc, Copper, and Boron. The remaining 9 Districts are proposed to be completed during this year. The State has distributed yearly 9 lakh soil health cards during last five years.

5.8 ORISSA

(i) The per hectare consumption of chemical fertilizer has gone up from about 5 kg per hectare in early seventies to about 60 kg per hectare at present. The low consumption of fertilizer as compared to national average is mostly attributed to limited scope for irrigation, lower adoption of high yielding varieties/ hybrids and traditional practices of cultivation.

(ii) There is wide inter-District and inter-crop variation in fertilizer consumption in the State.

(iii) Soil testing has now been taken up as a priority in the agricultural development programme. Annualy about 1.5 – 2 lakh soil health cards are being issued to the farmers.

(iv) Basic soil testing facilities have been provided to all the blocks (314 of the States).

(v) The existing 11 soil testing laboratories are being upgraded. 6 new Static Soil Testing Laboratories, 5 Mobile Soil Testing Laboratories, 2 New Fertilizer Quality Control Laboratories are being established. The soil testing facilities in 'Krishi Vigyan Kendras' are being upgraded.

(vi) For amelioration for acid soils an innovative scheme of using Paper Mill Sludge is being implemented which provides the sludge at Rs.10/- per 15 kg bag. The use of this sludge has resulted in an increase in crop yield of 14 – 52 % depending upon crop conditions.

(vii) Zinc Sulphate and Borax are being distributed.

(viii) Phosphogypsum is being distributed at subsidized prices particularly for oil seeds corps (ground nut).

(ix) The NPK ratio has come down from 6: 1.1 :6 .1 to about 1 :8 :1.

5.8.1 Suggestions:-

- ❖ Providing incentives for use of low analysis fertilizers (like SSP), micronutrients and secondary nutrients & bio-fertilisers;
- ❖ Encouraging soil testing by way of providing additional incentives to the farmers on chemical fertilizer required to be used in soil for meeting the nutrient deficiency i.e linking soil testing results to fertilizer use incentive;
- ❖ Facilitating establishment of more Micronutrient Fertilizers Factories;
- ❖ Development of appropriate Site Specific Nutrient Management (SSNM) programme by the SAU.
- ❖ Providing Leaf Colour Chart (LCC) to extension functionaries for guiding the farmers regarding appropriate time and dose of chemical fertilizer application (mainly Nitrogen) to prevent its over use;
- ❖ Awareness generation among farmers regarding INM, Balanced use of fertilizer etc. through trainings, demonstrations and mass media.
- ❖ Preparation of appropriate Fertiliser Movement Plan based on nutrient deficiency map and making it available at fair prices;
- ❖ Soil testing should be encouraged under PPP mode so as to extend this facility to more number of farmers;
- ❖ Soil survey wing with appropriate laboratory facility of the state needs to be revived.

5.9 PUNJAB

(i) Punjab is one of those States which use substantially high quantity of fertilizers to keep up their productivity levels. The nutrient consumption and NPK ratios are given below:-

Year	Consumption of nutrients in '000' MT				NPK ratio
	N	P	K	Total	
1996-97	961.8	228.4	17.5	1207.7	55.1:13.1:1
2008-09	1331.8	379.3	56.5	1767.6	23.6:06.7:1

(ii) As regards soil nutrient status the following explains the position:

(iii) Punjab soils being coarse textured and low in organic matter will continue to need nitrogen to replenish the absorption by plans. The same is of Phosphorous though there could be a short term build up of 'P' in the soil. The question that needs to be answered is whether this build up of 'P' is available for plan update. While the level of Potassium

is favourable in Punjab this needs to be watched in the event of increasing diversification from the rice- wheat cropping system.

(iv) As regards micro nutrients the status is as follows:

Nutrient	Percent soil samples deficient	
	1990	2010
Zinc	47	22
Iron	11	12
Manganese	3	12
Copper	1	2

5.9.1 Suggestions:

- The farmers of Punjab do not make full use of crop residues primarily because of labour cost and the short time available between crops. An 'engineering' solution to this problem need to be found and financial incentives provided to persuade farmers to use crop residues in the soil. Labour intensive, time consuming options may not work here.

- Green manure can be promoted if seeds can be given at highly subsidized cost.

- Fertilizer use on the basis of soil testing will help to rationalize the fertilizer use. The soil testing laboratories have to be strengthened in terms of equipments and trained man power. These are not to be restricted to the analysis of organic carbon, 'P' and 'K' but should also include micronutrients and plant nutrient analysis in soil and plant samples. A centrally coordinated soil, plant and water testing laboratory may be set up in each State which will provide regular training and updating of the laboratory staff and soil testing officers, and also keep check on the quality of analysis;

- Single Super Phosphate is a preferred source 'P' for pulses and oilseed crops as it supplies significant amount of Sulphur. A new straight Phosphatic fertilizer i.e Single Super Phosphate (14% P_2O_5 granulated) may be included in Schedule-I Part-A – 1(b) of the FCO, 1985 to ensure the easy availability of quality material;

- The use of gypsum may be promoted not only for reclamation of land but also for soil health improvement as it reduces sodium toxicity and pH. It is not only a source of Calcium and Sulphur but some micronutrients such as manganese etc. are also present as impurities;

- Integrated use of fertilizers and manures needs to be promoted. Recycling of as much farm wastes as possible should be encouraged. Standardization of organic manures, their preparation methods and quality criteria needs to be done;

- ❖ Promotion of legumes in crop rotation by developing pest resistant high yielding varieties and increasing the economics of pulses by fixing higher procurement prices. Green manuring, particularly dual purpose short duration pulses for grain and green manuring, particularly in south-western districts where water table is high and is of poor quality may be propagated.

- ❖ Quality control of micronutrient fertilizers must be assured.

5.10 RAJASTHAN

(i) The soil maps for 237 Panchayats are ready but most of these are of year 2000. Updating of these maps is in progress and is expectedly completed in 3 to 4 years. The State has 21 static, 11 mobile, 1 central laboratory. In addition they are putting up 12 mobile and 14 static laboratories. Their present capacity to analyse is 3.5 samples per year.

5.10.1 Suggestions:-

- ❖ Considering the difficult condition in Rajasthan recommendations have to be aligned fully with the different crops suited to the region.

- ❖ Research in application of fertilizer in drought tolerant crops and seeds varieties need to be taken up or priority.

5.11 TAMIL NADU

(i) The status of consumption of fertilizers in Tamil Nadu is as follows:

Year	LMTs				Kg. per hectare			
	N	P	K	Total	N	P	K	Total
2000-01	5.472	2.079	2.078	9.629	86	33	33	152
2008-09	6.467	2.550	3.636	12.653	125	49	70	244

(ii) The ratio of NPK consumption is 2:1:1.

(iii) The strategy followed by the Tamil Nadu Government includes issuing of soil health cards to all farming families in the State, soil test based fertilizer allocation, promotion of micro nutrients and promotion of organic manure and bio-fertilizers.

(iv) There are 30 STLs functioning in Tamil Nadu i.e. one in each District in addition to 16 mobile STLs with an annual analyzing capacity of around 11 lakh samples per annum. Government is enhancing this capacity by establishing 13 additional mobile STLs and strengthening 11 existing STLs.

(v) The State level Secondary/micro nutrient deficiencies worked out on available data are as follows:

Zinc	-	64%,
Copper	-	41%
Iron	-	21% and
Manganese	-	13%

(vi) The Tamil Nadu Government has an innovative scheme for establishing Agri clinic cum mini soil testing laboratories with bank loans and subsidy. These laboratories are run by unemployed agriculture graduates. Government intends to cover all the 385 blocks under this programme. Out of these, 346 laboratories have been established.

(vii) Government has distributed so far 21.76 lakh soil health cards against 80 lakh farm holdings.

(viii) Village Level Fertility Indices have been worked out and fertilizer recommendations for major crops are finalized and made available to the block office.

(ix) Government has some other innovative schemes like:-

- Conversion of farm wastes into compost by pleurotus: Under this scheme a mini kit containing 5 kg urea, 1 kg pleurotus and a technical pamphlet has been given to farmers
- Distribution of green manure seeds: This scheme envisages distribution of seeds of green manure crops at 25% subsidy. About 250 MTs of green manure seeds are distributed every year.
- Vermi composting: Vermi compost units and municipal compost units are subsidized at 50% of the cost.
- Blue green Algae and Azolla: Blue green Algae & Azolla are produced by the State Seed Farms and distributed to the farmers.
- Bio-Fertilizer : Six bio-fertilizer units functioning directly under the State Agricultural Department produced about 1600 MTs of bio fertilizer per annum. These include Azospirillum, Rhizobium, and Phosphobacteria.
- The Saline and Alkaline lands: The Saline and Alkaline land is being reclaimed by distributing Zinc, Sulphate and Gypsum at 50% subsidy.

5.11.1 Suggestions:

- ❖ Issuing of soil health cards to all farm families in the State
- ❖ Rationalization of fertilizer i.e Soil test based fertilizer allocation
- ❖ Promotion of Micronutrients
    - Micronutrient fertilizers can be brought under subsidy regime. At present only fortified fertilizers with micronutrients are included under subsidy.
    - Under NBS customized fertilizers are not given any subsidy but they are allowed to utilize the subsidized fertilizers as raw materials. Customized fertilizer manufacturers may be encouraged by the GOI.
    - 100% subsidy to be extended to micronutrients and micronutrient mixtures to popularize the technology. Instead of having micronutrient as a component in the schemes, separate scheme for micronutrients for promotion, laying out demonstrations, campaign and for distribution can be developed.
- ❖ Promotion of Organic manures and Bio-fertilizers.

5.12 UTTAR PRADESH

(i) The status of soil fertilizer in Uttar Pradesh is as follows:-

Major nutrients	**No. of Districts (fertility status)**				
	Very low	**Low**	**Medium**	**High**	**Total**
N	19	50	2	-	71
P	49	21	1	-	71
K	-	-	46	25	71
Secondary & micro nutrients	**Deficient**	**Marginal**	**Sufficient**		
Sulphur	16	48	4		68
Zinc	31	38	2		71
Iron	4	39	28		71
Magnese	3	26	42		71
Copper	1	18	52		71

(ii) Status of fertilizer consumption in the State is as follows:

Year	Fertilizer consumption in lakh MTs	N.P.K. ratio
2003-04	64.26	15.47 : 5 : 1
2008-09	78.54	11.52 : 3.87 : 1

(iii) UP has undertaken a major programme called "*Apni Mitti Pahchane Abhiyan*" promoting soil testing leading to balanced use of fertilizers. Government has a target of doing 20 lakh samples per year using the existing 73 district level soil testing laboratories and other Tehsil level soil testing laboratories. Out of these, 31 soil testing laboratories have facilities for testing micro nutrients. Government has also undertaken major green manuring programme and promotion of bio fertilizers and vermi compost.

5.12.1 Suggestions:-

- Granulated SSP with 14% 'P' may be permitted under FCO.
- Seeds of green manure should be a part of the seed plan of the Government of India. Managing crop residues should get top priority.
- For the improvement of organic matter in soil, NADEP and Vermi compost unit must be established in each farmer family;
- Enhance the use of Bio-fertilizers as per recommendation;
- Promote the customized fertilizer uses especially in cash crops;
- Use of balance fertilizers as per norms of soil testing report and crop wise requirement of N:P:K ratio;
- To facilitate the soil testing labs for micronutrient analysis and promote the use of micronutrients.

5.13 WEST BENGAL

(i) Intensive farming has resulted in lowering soil nutrients. The State uses adequate quantities of N & P but lags behind in the use of Potash, Boron, Zinc and Sulphur. The deficiency of Zinc, Sulphur and Boron are reported to the extent of 44, 28 and 10% respectively.

(ii) The State Government has strengthened the existing soil testing laboratories and is trying to establish a net work of soil, seeds, and inputs testing facilities in all the Districts.

(iii) State Government is also promoting complementary use of organic fertilisers and have prepared soil nutrient maps for 6 Districts.

5.13.1 Suggestions:

- The preparation of soil nutrient Map, using GPS based soil sampling and GIS based mapping can address the problem more precisely for identification of area-specific deficiencies. In case of areas depicting

high degree of variation, the updated version of the aforesaid technique, i.e. Remote Sensing Satellite Survey can be the best option.

- An approach towards mitigating such concern is Site Specific Nutrient Management (SSNM) which takes into account the spatial variation in landscape of Agriculture fields aiming at Effective Crop Planning. Fertilizer Recommendation on the basis of Nutrient Map, carrying out FMS activities more precisely, ascertaining deficiency of any nutrient that may spring up in future.

- There is urgent need to identify the region and crop specific constraints. Government of India may provide subsidy for organic fertilizer. The issue of crop diversification may need to be given a fresh look both from supply and demand perspective.

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Chapter – VI

Conclusions and Recommendations

A. Conclusions:

6.1 India's fertiliser consumption (overall and per hectare consumption) is growing. It is likely to increase further. Negative nutrient balance between crop removal and fertilizer addition is increasing.

6.2 Fertilizer response is steadily going down. Marginal response to NPK (Kg of foodgrain/ kg of NPK) has gone down from 13.4 in 1970 to 3.7 in 2005. This means that nutrients of about 218 kg/ha i.e. 4 times the earlier rate are now being added to sustain average yields of 2 tons/ha in irrigated areas.

6.3 Contrary to popular perception, (low or medium) 'N' and 'P' deficiencies persist. 465 out of 500 Districts are either low or medium in 'N' and 457 are low or medium in 'P'.

6.4 There are regions with low use of fertilizers. These areas (particularly in the Eastern Region) have the potential to become high productivity areas with appropriate input support.

6.5 Sulphur, Boron and Zinc are becoming increasingly deficient in Indian soils thereby affecting productivity. Adequate use of 'S', 'B' and 'Zn' (as the case may be) in addition to NPK is necessary to increase productivity and sustain soil health.

6.6 Liming of acidic soils can contribute to increasing productivity. Paper sludge and basic slag available as by-products in paper/steel mills can be utilized. Intervention in 12 million hectare of acidic soils can result in an increased production of 12 million tons of foodgrains.

6.7 Use of green/farm yard manure has decreased considerably due to inadequate availability, labour costs and higher prices. This has affected productivity and efficiency of fertilizer (chemical) use.

6.8 ICAR studies show substantial responses to Sulphur / Zinc / Boron application as a supplement to NPK. Similarly, application of

green manure / FYM as an additional input has resulted in substantial yield increase.

6.9 Many State Governments have realized the importance of soil testing and the need to introduce/ encourage a Site Specific Integrated Nutrient Management System.

6.10 Soil testing and preparation of soil maps continue to be slow, though the recent initiative of Government of India under the project 'The National Project on Management of Soil Health & Fertility' has brought a sense of urgency. The performance, however, needs to be accelerated.

6.11 In spite of provisions being made in the scheme mentioned above, the PPP mode for soil testing has not yet taken off.

6.12 The shortage of qualified personnel for soil testing laboratories has affected the progress and quality of soil testing. Many States are of the view that a separate cadre of Soil Scientists needs to be created to ensure continued availability of qualified personnel for soil testing. Alternately PPP should be expanded in the programme.

6.13 100 Districts in the country consume 49% fertilizer (NPK). It is important to focus on these Districts for optimum use.

6.14 District-wise assessment of fertiliser demand based on soil fertility, irrigation potential and crop/seed characteristics is essential for effective fertilizer planning.

6.15 Urban and rural wastes can effectively be converted to manure. Cost issues and the elements of subsidy need to be worked out.

6.16 Phosphogypsum is available in large quantities and has potential as a secondary nutrient. Some of the issues related to moisture etc. needs to be sorted out.

6.17 Given the condition of Rock Phosphate in the country, SSP (with 14% P_2O_5 granulated) may be available in large quantities. This could be brought under FCO for its effective use

6.18 Given the fact that India's demand for agricultural products will grow at a faster rate and given the constraints of availability of land for agriculture, there is no option but to increase productivity on a sustainable basis. This is possible only with a balanced replenishment of soil nutrients using bio and chemical resources.

6.19 Manufacture of micronutrients is reserved for SSI presently. This is a major constraint in expanding their use.

6.20 Quality of fertilisers remains a concern. Though there are Fertilizer Quality Control Laboratories, their impact is grossly inadequate. In Process Quality Control (IPQC) and appropriate testing norms seem to be absent in small fertiliser manufacturing units.

6.21 Managing crop residues continues to be a challenge.

6.22 New technologies and new seeds demand different levels of application of fertilisers and management. Quality considerations in the market are likely to induce changes in fertilizer use. Therefore, the composition of fertiliser use may undergo changes depending on a number of factors.

6.23 Fertigation is a very effective way of saving water and optimizing the use of fertilisers. Fertigation is still at a nascent stage in India and confined to precision farming. Dependence on imported liquid/soluble fertilizers coupled with high levels of customs duty is mainly responsible for this state of affairs.

B. Recommendations

6.24 Introduce Site Specific Nutrient Management (SSNM)

6.24.1 To optimize the use and efficiency of fertilizer use and to increase productivity of crops in India, a shift to SSNM is necessary. (Site Specific Nutrient Management includes integrated and balanced nutrient management). It is difficult to effect this change all over the country in a short time.

6.24.2 100 Districts which consume about 50% of NPK could be the first to take up SSNM. This should be followed by those districts which have major soil nutrient problems and large areas under crops or special problems of soil degradation.

6.24.3 SSNM should include NPK, secondary and micro-nutrients and soil ameliorants.

6.24.4 Addition of green/ farm yard manure/biofertilizers should be an integral part of SSNM. These need to be encouraged with higher support if possible.

6.24.5 It should be based on the specific conditions in various agro-climatic zones. However the technical data relating these zones should be converted to implementable district wise action plans. District action plans will fit into the existing schemes of RKVY, NFSM etc and will be administratively convenient.

6.24.6 The District Agricultural Plans (DAPs) should include an SSNM plan drawn up with technical support from KVKs and SAUs.

6.24.7 Fertiliser demand should be assessed on the basis of District-wise demand taking into account soil fertility, irrigation and crop/seed characteristics.

6.25 Improve the quality and range of soil testing:

6.25.1 The success of SSNM depends upon the accuracy and timeliness of soil nutrient data. Data available at present in many States are out-dated and do not capture secondary and micro-nutrient deficiencies. The following are recommended:

6.25.2 Improve and accelerate performance under the Ministry of Agriculture programme: "The National Project on Management of Soil Health and Fertility". Provide more flexibility in operation either in the programme itself or through RKVY etc.

6.25.3 Strengthen the technical capabilities of State Soil Testing Laboratories by training Soil Scientists. States may be advised to create a separate cadre of Soil Scientists in the Agriculture Department. Encourage Soil Scientists to take up extension / advisory services along with soil testing.

6.25.4 Encourage setting up of more Soil Testing Laboratories in the PPP mode including by APMCs and fertiliser companies. Most APMCs and fertilizer companies can do this with their own resources.

6.25.5 Fertilizer companies get about 4.5 – 5.0 Lakh soil samples tested every year. Place this data in the public domain and integrate this with ICAR (IISS) data.

6.25.6 The on-going ICAR project on soil nutrient mapping covering 19 major States and 171 Districts should be completed on time. Priority should be given to the 100 districts consuming 50% of the total fertilizer consumption in the country.

6.25.7 ICAR should be the technical supervisory and coordinating agency to do the digitized soil nutrient maps.

6.26 Move forward on Nutrient Based Subsidy to encourage SSNM:

6.26.1 Nutrients like Sulphur, Zinc and Boron need to be promoted making them affordable to farmers. A comparatively higher level of subsidy vis-a-vis NPK is recommended.

6.26.2 Urea has to be brought under the free pricing regime sooner than later. In any case, there is a strong case for reducing the subsidy on urea and allowing a higher price to discourage unproductive use. Farmers can be assisted by providing appropriate subsidies on other critical nutrients.

6.26.3 The underlying concept of NBS is equal subsidy for the same nutrient in any form; either as a straight fertilizer or as a complex/ mixture. This needs to be operationalised for all FCO approved fertilizers at the earliest.

6.26.4 While moving towards free pricing of fertilisers and finally to 'direct cash transfer to farmers' a suitable mechanism for quality control needs to be established. Issues like monopoly pricing should be addressed under the existing legal framework.

6.27 Actively encourage setting up of customized fertilizer units:

6.27.1 Customized fertilizer is the future. The first investment in this sector is taking place. Other prospective investors seem to be waiting and watching. It is important that these efforts succeed. These are medium scale units using subsidized straight fertilizers customized to a local area (agro-climatic zone). This involves a deeper understanding of the soils, climate and crops. Normally application of customized fertilizers should result in optimization of fertilizer use and higher productivity. This effort can succeed only with the backing of soil testing facilities. It is necessary therefore:

(i) to provide support under soil testing programmes of the Government on a priority basis for these areas;

(ii) to provide research backup on crops grown in these regions through the National Agricultural Research System; and

(iii) to provide fiscal and financial incentives to these units. A higher level of tax exemption can be considered for research and extension activities and a capital subsidy thought of for the investment.

6.28 Promote use of Fortified fertilizers:

Some of the secondary / micro-nutrients can be given in the form of fortified fertilizers. This will reduce farmers' costs and also add to productivity. Region /crop specific nutrients may be permitted /encouraged for fortification.

6.29 Encourage different options taking into consideration India's own resources:

6.29.1 Given the fact that India is dependent on foreign sources for supply of substantial quantities of fertilizers, it is important to develop, to the extent possible, own resources and use them effectively. In this context, the following recommendations are made:

6.29.2 Given the quality of Rock Phosphate in the country, SSP with 14% P_2O_5 granulated need to be permitted under a different category (this can be called SSP 'lite') and approved within the FCO.

6.29.3 Phosphogypsum, a cheap resource of 'S', is available in substantial quantities in the country. ICAR is of the view that this can be used with minor modifications. A commercially viable process to use Phosphogypsum needs to be put in place immediately.

6.29.4 Industrial by-products from certain industries can be used effectively as soil ameliorants. Paper Mill sludge has been used effectively in Orissa. Basic slag from steel mills can also be used. Similar efforts must be encouraged.

6.29.5 Organic farming is gaining ground and needs more support. It is probably difficult to standardize organic fertilizers and bring them all under a subsidy regime. Support to organic farming/use of organic fertilisers need to be studied separately and a policy evolved by Ministry of Agriculture.

6.29.6 Promotion of local (Village, Panchayat) efforts in using organic manure is a better option and this may be encouraged. The villages could be supported on the basis of improvement in soil organic carbon levels.

6.29.7 In addition to organic farming which has limited reach, large scale use of green/farmyard manure/biofertilisers in combination with chemical fertilizers should be promoted. The suggestion to provide seeds of green manure crops free of cost to farmers is to be considered. Seeds for green manure also need to be a major part of the Seed Plan of Government of India/State Governments. These interventions could be done under RKVY/NFSM.

6.30 Ensure quality of fertilizers:

6.30.1 Some of the problems in the fertilizer sector relate to quality. There have been complaints about inferior quality fertilizers finding their way into the market. This needs to be stopped by ensuring that only such manufacturers who have the ability to put up in process quality control systems are allowed to manufacture fertilizers. In the case of SSP, though the industry feels that the subsidy policy has been responsible for their negative growth, quality issues had also emerged as a major problem.

6.30.2 Problems relating to quality need to be addressed through constant monitoring of quality by independent fertilizer quality control laboratories and by taking the strictest action permissible under the law for bad quality fertilizers. There must be a provision of complete ban on the sale of fertilizers produced by such factories which have failed the quality tests consistently.

6.30.3 Fertiliser Quality Control labs must be accredited either under NABL or under a competent technical body. These laboratories must perform as per approved standards and the accreditation withdrawn for inadequate or improper compliance.

6.31 Encourage change in the current practice of farming to get more value out of industrial resources:

There are many practices prevalent in various parts of the country which do not encourage *in-situ* conservation of moisture and nutrients. Farmers in parts of western India burn their crop residues in the field to clear the land for early sowing. This practice needs to be discouraged. The farmers are hoping that an "agri-engineering" solution for managing crop residues will be found to help them save time and labour costs. In addition, initiatives like zero tilling, conservation agriculture etc. needs to be actively promoted to ensure that the nutrient value of the soil is not lost for reasons other than agriculture. Along with this, management of moisture/water is equally important, particularly in the case of paddy, where overuse of irrigation results in wastage of fertilizers.

6.32 Strengthen technology transfer/extension:

In any plan to move to district specific SSNM, the role of technology transfer/extension agencies is crucial. At present ATMAs, State Extension Agencies and KVKs are responsible for this work. Most of them would need reorientation in terms of technical knowledge for moving towards SSNM. A programme to train these agencies and to make them responsible for optimizing fertilizer efficiency and utilization on a site-specific, crop-specific basis is needed. In addition, the Agriculture Produce Market Committees which normally are cash rich organizations should be mandated to support soil testing efforts and the implementation of SSNM. Wider use of leaf colour charts as an easy way to recognize nutrient deficiencies should be propagated. The soil testing laboratories should, with support from KVKs, SAUs etc. also send advisories to farmers on crop and soil specific nutrients. This could be done using either the common service centres under the e-governance projects or through mobile telephony.

6.33 Strengthen research in SSNM:

ICAR, State Agriculture Universities and KVKs need to take up site-specific nutrition management as a priority item in their research efforts. They should also focus on combining the use of available natural and other resources with chemical fertilizers to get increase in productivity on a sustainable basis.

6.34 Encourage use of urban and rural waste:

Both cities and rural areas generate a lot of biodegradable waste. This can be converted to manure. While cities are struggling with the problem of disposal of waste, there is a demand for manure in the rural areas. However, costing this and the likely subsidies associated with this effort seem to be holding up initiatives in this regard. It is fair for the cities to at least pay for the sorting out and transportation of bio-degradable waste to a location where it can be permitted for conversion to bio/organic fertilizers. The fertilizer companies can also be mandated to sell such fertilizers as part of their SSNM strategy.

6.35 Make FCO compatible with SSNM and customized fertilizers:

The provisions in FCO provide for specific trials before any new fertilizer is introduced by a Company. While this may be required for new nutrients/elements, there is a case for providing fast track approvals for such customized fertilizers and complexes recommended by ICAR/SAUs as part of SSNM.

6.36 Improve distribution logistics:

There are issues relating to shortage of fertilizers on account of inadequate logistics.

6.36.1 Starting with handling and bagging facilities at the ports, every activity through the supply chain is affected by inadequate and inefficient logistics. This helps the black-market since farmers do not wait for stocks to arrive just in time. The following are recommended:

6.36.2 Handling /bagging operations in all ports should be mechanized on a priority basis.

6.36.3 An operationally feasible plan of movement should be made based on Railways' capabilities and constraints. A 'ship to farm' operation at the beginning of the season should be avoided. Stocks should reach well in advance.

6.36.4 State level agencies should play a pro-active role in ensuring adequate stocking of fertilizers. Since private traders will avoid incurring the cost of inventory, state agencies should play a more pro-active role including holding inventories even at a cost.

6.36.5 Information on the stocks available with the dealers must be placed in the public domain on a daily basis.

6.37 Use provisions under RKVY / NFSM etc. in synergy with NBS

6.37.1 Some of the inputs for optimization are at present outside the purview of NBS/Fertilizer subsidy. (Liming of acidic soils is one such example). Provisions under NFSM / RKVY should be used

optimally to provide support for those critical components for which fertilser subsidy is not available.

6.37.2 Since developing SSNM packages based on soil fertility/crop status will depend on the efficiency/commitment of State Governments, conditionalities linking performance to allocations need to be built into some of the flagship schemes of the Ministry of Agriculture.

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Annexure – II A

ALL INDIA CONSUMPTION OF N, P_2O_5 & K_2O
(1950-51 to 2008-09)

('000 tonnes)

Year		N	P_2O_5	K_2O	Total ($N+P_2O_5+K_2O$)
1950-51		55.0	8.8	6.0	69.8
1951-52	I Plan	58.7	6.9		65.6
1952-53		57.8	4.6	3.3	65.7
1953-54		89.3	8.3	7.5	105.0
1954-55		94.8	15.0	11.1	120.9
1955-56		107.5	13.0	10.3	130.8
1956-57	II Plan	123.1	15.9	14.8	153.7
1957-58		149.0	21.9	12.8	183.7
1958-59		172.0	29.5	22.4	223.8
1959-60		229.3	53.9	21.3	304.6
1960-61		211.7	53.1	29.0	293.8
1961-62	III Plan	249.8	60.5	28.0	338.3
1962-63		333.0	82.8	36.4	452.2
1963-64		376.1	116.5	50.6	543.2
1964-65		555.2	148.7	69.3	773.2
1965-66		574.8	132.5	77.3	784.6
1966-67		737.8	248.6	114.2	1,100.6
1967-68		1,034.6	334.8	169.6	1,539.0
1968-69		1,208.6	382.1	170.0	1,760.7
1969-70	IV Plan	1,356.0	416.0	210.0	1,982.0
1970-71		1,479.3	541.0	236.3	2,256.6
1971-72		1,798.0	558.2	300.6	2,656.8
1972-73		1,839.0	581.3	347.6	2,767.9
1973-74		1,829.0	649.7	359.8	2,838.6
1974-75	V Plan	1,765.7	471.5	336.1	2,573.3
1975-76		2,148.6	466.8	278.3	2,893.7
1976-77		2,456.9	634.7	319.2	3,410.9
1977-78		2,913.0	866.6	506.2	4,285.8
1978-79		3,419.5	1,106.0	591.5	5,116.9
1979-80		3,498.1	1,150.9	606.4	5,255.4
1980-81	VI Plan	3,678.1	1,213.6	623.9	5,515.6
1981-82 (Feb./January)		4,068.7	1,322.3	676.2	6,067.2
1982-83 (Feb./ January)		4,224.2	1,435.9	726.5	6,386.6
1982-83 (April/March)		4,242.5	1,432.7	726.3	6,401.4
1983-84		5,204.4	1,730.3	775.4	7,710.1
1984-85		5,486.1	1,886.4	838.5	8,211.0
1985-86	VII Plan	5,660.8	2,005.2	808.1	8,474.1
1986-87		5,716.0	2,078.9	850.0	8,644.9
1987-88		5,716.8	2,187.1	880.5	8,784.3
1988-89		7,251.0	2,720.7	1,068.4	11,040.1
1989-90		7,385.9	3,014.2	1,168.0	11,568.2
1990-91		7,997.2	3,221.0	1,328.0	12,546.2
1991-92		8,046.3	3,321.2	1,360.6	12,728.0
1992-93	VIII Plan	8,426.8	2,843.8	883.9	12,154.5
1993-94		8,788.3	2,669.3	908.7	12,366.3
1994-95		9,507.1	2,931.7	1,124.8	13,563.6
1995-96		9,822.8	2,897.5	1,155.8	13,876.2
1996-97		10,301.8	2,976.8	1,029.6	14,308.1
1997-98	IX Plan	10,901.8	3,913.6	1,372.5	16,187.8
1998-99		11,353.8	4,112.2	1,331.5	16,797.5
1999-2000		11,592.5	4,797.9	1,678.4	18,068.9
2000-01		10,920.2	4,214.6	1,567.5	16,702.3
2001-02		11,310.2	4,382.4	1,667.1	17,359.7
2002-03	X Plan	10,474.1	4,018.8	1,601.2	16,094.1
2003-04		11,077.0	4,124.3	1,597.9	16,799.1
2004-05		11,713.9	4,623.8	2,060.7	18,398.4
2005-06		12,723.3	5,203.7	2,413.3	20,340.3
2006-07		13,772.9	5,543.3	2,334.8	21,651.0
2007-08	XI Plan (1st 2 years)	14,419.1	5,514.7	2,636.3	22,570.1
2008-09 (P)		15,090.5	6,506.2	3,312.6	24,909.3
(P) = Provisional.			Note : Total may not exactly tally due to rounding off.		

Annexure – II B

ALL-INDIA CONSUMPTION OF FERTILISER PRODUCTS
1990-91 to 2008-09

('000 tonnnes)

Year Seasons	Urea	A/S	ACI	CAN	SSP	TSP	MOP	SOP	DAP	MAP	Rock	10-26-26
1990-91												
Kharif	6,415.42	291.48	38.08	184.53	1,750.25		813.95	14.90	1,690.72		61.87	197.07
Rabi	7,661.13	239.98	47.33	211.80	1,807.99		817.02	16.80	2,557.39		73.22	136.84
Total	14,076.55	531.46	85.41	396.33	3,558.24		1,630.97	31.70	4,248.11		135.09	333.91
1991-92												
Kharif	6,443.68	232.38	38.65	182.10	1,766.87		844.03	14.24	1,887.57		61.71	183.26
Rabi	7,559.61	254.69	47.19	218.16	1,397.92		856.85	6.57	2,630.14		59.37	150.72
Total	14,003.29	487.07	85.84	400.26	3,164.79		1,700.88	20.81	4,517.71		121.08	333.98
1992-93												
Kharif	6,575.74	252.70	52.73	195.59	1,146.06		671.09	8.96	1,933.96		43.01	124.49
Rabi	8,329.67	317.74	70.27	359.12	862.40		303.21	7.41	2,118.04		56.27	80.68
Total	14,905.41	570.44	123.00	554.71	2,008.46		974.30	16.37	4,052.00		99.28	205.17
1993-94												
Kharif	7,290.40	263.30	50.40	310.49	1,052.50		486.24	5.35	1,389.78		57.26	226.31
Rabi	8,520.06	328.12	88.84	318.61	1,300.15		566.49	3.43	2,090.31		63.73	207.34
Total	15,810.46	591.42	139.24	629.10	2,352.65		1,052.73	8.78	3,480.09		120.99	433.65
1994-95												
Kharif	7,945.40	246.41	44.98	245.34	1,294.93		548.33	6.82	1,659.77		62.45	256.34
Rabi	9,166.46	302.00	70.23	261.13	1,331.34		722.03	4.08	1,925.75		64.11	101.93
Total	17,111.86	548.41	115.21	506.47	2,626.27		1,270.36	10.90	3,585.52		126.56	358.27
1995-96												
Kharif	8,820.27	309.08	42.81	209.20	1,645.92		710.03	8.73	1,686.40		56.75	112.67
Rabi	9,088.68	278.94	69.34	238.48	1,337.41		682.25	3.17	1,765.07		84.20	119.28
Total	17,908.95	588.02	112.15	447.68	2,983.33		1,392.28	11.90	3,451.47		140.95	231.95
1996-97												
Kharif	9,227.67	300.58	50.87	182.91	1,518.94		626.22	7.77	1,542.67		62.12	137.75
Rabi	9,796.81	353.08	70.19	212.21	1,499.48		571.52	3.03	2,081.31		83.20	112.97
Total	19,024.48	653.66	121.06	395.12	3,018.42		1,197.74	10.80	3,623.98		145.32	250.72
1997-98												
Kharif	9,479.08	330.37	49.83	184.88	1,909.09		883.41	7.69	2,842.73		76.77	162.83
Rabi	10,139.77	276.13	53.75	216.62	1,750.65		845.61	7.46	2,529.46		83.13	160.47
Total	19,618.85	606.50	103.58	401.50	3,659.74		1,729.02	15.15	5,372.19		159.90	323.30
1998-99												
Kharif	9,893.15	293.25	33.80	181.65	1,826.57		464.33	11.43	2,674.78		61.38	154.50
Rabi	10,503.28	272.51	44.85	286.57	1,865.95		1,156.61	4.54	3,153.48		63.70	163.00
Total	20,396.43	565.76	78.65	468.22	3,692.52		1,620.94	15.97	5,828.26		125.08	317.50
1999-00												
Kharif	10,134.15	323.71	30.84	180.12	1,858.68		982.60	9.38	3,182.54		70.40	238.72
Rabi	10,143.60	314.39	44.35	167.13	1,742.43		1,066.25	8.12	3,754.35		32.41	291.07
Total	20,277.75	638.10	75.19	347.25	3,601.11		2,048.85	17.50	6,936.89		102.81	529.79
2000-01												
Kharif	9,695.54	313.59	21.47	112.00	1,641.70		834.56	6.77	2,420.36		61.18	280.20
Rabi	9,490.91	301.50	46.01	130.87	1,218.32		994.70	2.90	3,464.24		20.20	298.23
Total	19,186.45	615.09	67.48	242.87	2,860.02		1,829.26	9.67	5,884.60		81.38	578.43
2001-02												
Kharif	9,706.40	251.80	21.95	92.37	1,412.75		948.93	9.45	2,572.66		51.66	262.18
Rabi	10,210.90	286.96	51.63	89.60	1,191.88		1,043.54	8.88	3,608.38		29.40	318.76
Total	19,917.30	538.76	73.58	181.97	2,604.63		1,992.47	18.33	6,181.04		81.06	580.94

2002-03												
Kharif	8,818.61	205.91	22.99	81.35	1,384.83		839.99	9.72	2,148.50		47.29	260.46
Rabi	9,674.48	266.93	32.27	79.25	1,113.96		1,072.03	9.56	3,324.55		30.50	353.94
Total	**18,493.09**	**472.84**	**55.26**	**160.60**	**2,498.79**		**1,912.02**	**19.28**	**5,473.05**		**77.79**	**614.40**
2003-04												
Kharif	9,403.48	229.24	31.33	66.10	1,262.43		818.06	17.93	2,247.49		51.43	213.21
Rabi	10,364.00	309.58	43.61	76.90	1,281.36		1,023.11	3.96	3,377.40		23.39	291.34
Total	**19,767.48**	**538.82**	**74.94**	**143.00**	**2,543.79**		**1,841.17**	**21.89**	**5,624.89**		**74.82**	**504.55**
2004-05												
Kharif	9,899.37	277.64	27.21	89.67	1,301.24		1,127.12	18.92	2,491.33		41.26	297.09
Rabi	10,765.82	250.93	54.97	94.70	1,248.11		1,279.08	6.70	3,764.45		21.30	525.68
Total	**20,665.19**	**528.57**	**82.18**	**184.37**	**2,549.35**		**2,406.20**	**25.62**	**6,255.78**		**62.56**	**822.77**
2005-06												
Kharif	10,858.26	268.10	21.79	88.31	1,459.03		1,193.19	22.06	2,678.41		37.24	487.47
Rabi	11,439.25	306.03	34.46	83.52	1,296.92		1,538.07	5.81	4,085.51		23.13	719.83
Total	**22,297.51**	**574.13**	**56.25**	**171.83**	**2,755.95**		**2,731.26**	**27.87**	**6,763.92**		**60.37**	**1,207.30**
2006-07												
Kharif	11,588.26	277.51	26.47	72.31	1,546.28		1,053.67	22.97	3,525.63		30.11	656.09
Rabi	12,749.40	280.40	29.65	72.89	1,364.19		1,531.94	4.29	3,855.37		12.87	685.30
Total	**24,337.66**	**557.91**	**56.12**	**145.20**	**2,910.47**		**2,585.61**	**27.26**	**7,381.00**		**42.98**	**1,341.39**
2007-08												
Kharif	12,324.32	243.12	4.80	65.02	1,495.23		1,487.33	22.63	3,409.02	-	31.72	824.12
Rabi	13,638.83	140.90	-	72.55	792.53		1,393.36	7.46	4,087.59	150.43	18.27	1,259.84
Total	**25,963.15**	**384.02**	**4.80**	**137.57**	**2,287.76**		**2,880.69**	**30.09**	**7,496.61**	**150.43**	**49.99**	**2,083.96**
2008-09(P)												
Kharif	12,891.17	193.61	-	56.15	1,195.91	91.98	2,170.56	23.94	4,755.43	121.10	32.99	1,322.30
Rabi	13,758.04	191.17	-	67.85	1,420.70	114.56	1,906.77	6.19	4,475.78	102.77	24.29	1,040.06
Total	**26,649.21**	**384.78**	**-**	**124.00**	**2,616.61**	**206.54**	**4,077.33**	**30.13**	**9,231.21**	**223.87**	**57.28**	**2,362.36**

Annexure – II C

6.06(a) STATE-WISE CONSUMPTION RATIO OF N & P_2O_5 IN RELATION TO K_2O AND N IN RELATION TO P_2O_5
2007-08 & 2008-09

Zone/State	N:P_2O_5:K_2O						N:P_2O_5			
	2007-08			2008-09 (P)			2007-08		2008-09 (P)	
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	N	P_2O_5
EAST	**4.0**	**1.5**	**1**	**2.9**	**1.2**	**1**	**2.6**	**1**	**2.4**	**1**
Arunachal Pradesh	5.0	2.1	1	5.7	2.3	1	2.4	1	2.4	1
Assam	1.8	1.0	1	2.0	0.8	1	1.9	1	2.4	1
Bihar	11.0	2.3	1	5.7	1.5	1	4.9	1	3.7	1
Jharkhand	9.2	4.7	1	7.0	3.6	1	2.0	1	1.9	1
Manipur	11.0	2.6	1	6.4	1.3	1	4.3	1	4.8	1
Meghalaya	7.7	3.7	1	6.5	1.7	1	2.1	1	3.8	1
Mizoram	2.1	1.2	1	2.0	1.1	1	1.8	1	1.8	1
Nagaland	3.9	2.1	1	3.9	2.7	1	1.9	1	1.5	1
Orissa	4.3	1.9	1	3.3	1.7	1	2.3	1	2.0	1
Sikkim	-	-	1	-	-	1	-	1	-	1
Tripura	3.4	1.2	1	2.7	1.3	1	2.9	1	2.1	1
West Bengal	2.2	1.3	1	1.7	1.0	1	1.8	1	1.7	1
NORTH	**19.5**	**5.5**	**1**	**14.6**	**4.5**	**1**	**3.5**	**1**	**3.2**	**1**
Haryana	39.8	10.9	1	32.2	10.7	1	3.7	1	3.0	1
Himachal Pradesh	3.7	1.0	1	3.2	1.0	1	3.6	1	3.3	1
Jammu & Kashmir	11.9	3.6	1	8.1	3.3	1	3.3	1	2.5	1
Punjab	34.3	9.0	1	23.6	6.7	1	3.8	1	3.5	1
Uttar Pradesh	15.1	4.5	1	11.5	3.6	1	3.3	1	3.2	1
Uttarakhand	11.2	2.4	1	8.8	2.4	1	4.7	1	3.7	1
Delhi	30.0	8.0	1	-	-	1	3.8	1	-	1
SOUTH	**2.7**	**1.2**	**1**	**2.5**	**1.3**	**1**	**2.2**	**1**	**1.9**	**1**
Andhra Pradesh	3.8	1.7	1	3.5	1.7	1	2.2	1	2.0	1
Karnataka	2.4	1.2	1	2.1	1.4	1	2.0	1	1.5	1
Kerala	1.3	0.6	1	1.2	0.6	1	2.2	1	2.0	1
Tamil Nadu	1.8	0.7	1	1.8	0.7	1	2.4	1	2.5	1
Pondicherry	2.3	1.0	1	2.6	0.9	1	2.3	1	2.8	1
A & N Islands	3.3	3.0	1	2.0	1.3	1	1.1	1	1.6	1
WEST	**5.7**	**2.6**	**1**	**5.0**	**2.6**	**1**	**2.2**	**1**	**1.9**	**1**
Gujarat	7.2	2.9	1	5.8	2.5	1	2.5	1	2.3	1
Madhya Pradesh	10.5	5.7	1	8.9	5.9	1	1.8	1	1.5	1
Chhattisgarh	5.2	2.2	1	4.4	2.2	1	2.3	1	2.0	1
Maharashtra	3.0	1.5	1	2.8	1.6	1	2.0	1	1.8	1
Rajasthan	33.7	12.5	1	30.2	13.6	1	2.7	1	2.2	1
Goa	1.9	1.0	1	1.4	1.3	1	1.9	1	1.0	1
Daman & Diu	12.7	2.0	1	14.5	4.0	1	6.3	1	3.6	1
D & N Haveli	11.4	8.0	1	12.2	8.8	1	1.4	1	1.4	1
All India	**5.5**	**2.1**	**1**	**4.6**	**2.0**	**1**	**2.6**	**1**	**2.3**	**1**

(P) = Provisional.

Annexure - II D

Fertilizer use on important crops, 2003/04

Crop	Gross cropped area (million ha)	Share in fertilizer consumption (%)	Fertilizer consumption (kg/ha)			
			N	P_2O_5	K_2O	Total
Cotton	**8.5**	**6**	**89.5**	**22.6**	**4.8**	**116.8**
Irrigated	2.9	2.7	115.7	30.9	7	153.5
Rainfed	5.6	3.3	75.8	18.2	3.6	97.7
Groundnut	**6.6**	**2.9**	**24.4**	**39.3**	**12.9**	**76.6**
Irrigated	1.2	0.8	35.3	53.8	28.9	118
Rainfed	5.4	2.1	21.9	36	9.2	67.2
Jute	**0.8**	**0.2**	**38**	**11.5**	**5**	**54.4**
Irrigated	0.3	0.1	55.9	22.4	10.2	88.6
Rainfed	0.5	0.1	28.9	6	2.3	37.1
Maize	**6.6**	**2.3**	**41.7**	**14.7**	**3.8**	**60.2**
Irrigated	1.5	0.8	59.6	27.7	4.8	92.1
Rainfed	5.1	1.5	36.6	11	3.6	51.1
Paddy	**44.7**	**31.8**	**81.7**	**24.3**	**13.1**	**119.1**
Irrigated	24	22.2	103.4	32.8	18.8	155
Rainfed	20.7	9.6	56.6	14.5	6.5	77.6
Pearl millet	**9.8**	**1.7**	**21.9**	**5.5**	**0.8**	**28.2**
Irrigated	0.8	0.4	62.2	13.9	3.4	79.5
Rainfed	9	1.3	18.4	4.8	0.6	23.8
Pigeon pea	**3.6**	**0.8**	**20.9**	**13.3**	**2**	**36.2**
Irrigated	0.2	0.1	36.9	20.9	2.2	60
Rainfed	3.5	0.7	19.6	12.6	2	34.2
Rapeseed & mustard	**6**	**3.4**	**69.1**	**25**	**2.9**	**97**
Irrigated	3.8	2.6	81.7	30.4	4.3	116.5
Rainfed	2.2	0.8	45.9	15	0.4	61.3
Sorghum	**9.9**	**2.9**	**29.2**	**14.2**	**4.1**	**47.5**
Irrigated	0.8	0.5	58.5	29.1	10.7	98.3
Rainfed	9.1	2.4	26.9	13	3.6	43.6
Sugar cane	**4.3**	**5.4**	**124.8**	**44**	**38.3**	**207.1**
Irrigated	4.2	5.3	126.4	45	40.6	212
Rainfed	0.1	0.1	106	32	12.4	150.4
Wheat	**25.7**	**21**	**99.6**	**30.2**	**6.9**	**136.7**
Irrigated	22.8	19.7	105.6	32.1	7.3	144.9
Rainfed	2.9	1.3	55.7	15.9	4.3	75.9
Other crops	**60.4**	**21.6**	**34.5**	**18.5**	**7.1**	**60.1**
Irrigated	12.6	13.3	113.5	46.8	16.5	176.7
Rainfed	47.8	8.3	13.6	11	4.7	29.3
All crops	**187**	**100**	**59.2**	**22.1**	**8.5**	**89.8**
Irrigated	75.1	68.5	103.2	35.3	14.5	153.1
Rainfed	111.9	31.5	29.7	13.1	4.5	47.3

Annexure - III-A

List of Districts under Low/Medium/High Nutrient (NPK)

State	Nutrient	Status	District
Andhra Pradesh	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	N	Low	Bongaigaon, Borpeta, Chirang, Darrang, Kokrajhar, Morigaon, NC 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, NC Hills, Nagaon, Nalbari, Sivsagar,Sonitpur, Tinsukia
		High	
	K	Low	Bongaigaon, Cachar, Chirang, Golaghat, Hailakandi, Jorhat, Karimganj, Kokrajhar, NC Hills, Nagaon, Sivsagar, Udalguri
		Medium	Borpeta, Darrang, Dhemaji, Dhubri, Goalpara, Kamrup, Lakhimpur, Morigaon, Nalbari Sonitpur, Tinsukia
		High	Dibrugarh, Karbi angling
BIHAR	N	Low	Aurangabad, Bhagalpur, Baka, Sekhpura, Jamui, Lakhisarai, Darbhangha, 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 Lakkhisarai, Bhojpur, Darbhangha, East Champaran, Gopalganj, Khagaria, Madhubani, Munger, Muzaffarpur, Nalanda, Nawadah, Patna, Shivhar, Sitarmarhi, Vaisale, West Champaran

Bihar		High	Samastipur
	K	Low	Gaya, Jahanabad, Arbal Madhepura, Madhubani, Muzaffarpur, Saharsha, Sapual Vaisale
		Medium	Baksar, Bhabhua Rohatash, Begusarai, Bhagalpur, Baka, Sekhpura, Jamui, Lakhisarai, Bhojpur, Darbhangha, East Champaran, Gopalganj, Katihar, Khagaria, Kisangang, Munger Nalanda, Nawadah, Patna, Purnia, Samastipur, Sharan, Shivhar, Sitarmarhi, Sivan, West Champaran
		High	Aurangabad
Chhatis-garh	N	Low	Bastar, Dantewara, Dhamtari, Durg, Kanker, Kawardha, Mahasmund, Raipur, Rajnandgaon
		Medium	Baikunthapur, Bilaspur, Janigir, Jashpur, Korba, Koriya, Rajgarh, Sarguja
		High	
	P	Low	Baster, 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	Baikunthapur, Bilaspur, Durg, Janigir, Jashpur, Kawardha, Korba, Koriya, Rajgarh, Sarguja
Gujarat	N	Low	Amreli, Banaskantha, Bharuch, Gandhinagar, Jamnagar, Katchh, Mahesana, Narmada, Patan, Sabrkantha, Surat, Surendranagar, Vadodara
		Medium	Anand, Bhawnagar, Dahod, Dang, Kheda, Navsari, Panchmahl, Valsad
		High	Junagadh, Porbandar, Rajkot
	P	Low	Banaskantha, Bharuch , Bhawnagar, Dahod, Mahesana, Narmada, Navsari, Panchmahal, Patan, Porbandar, Surendranagar, Valsad
		Medium	Amreli, Anand, Dang, Gandhinagar, Jamnagar, Junagadh, Katchh, Kheda, Rajkot, Sabrkantha, Surat, Vadodara
		High	
	K	Low	
		Medium	Banaskantha, Katchh, Sabrkantha, Vadodara
		High	Amreli, Anand, Bharuch, Bhawnagar, Dahod, Dang, Gandhinagar, Jamnagar, Junagadh, Kheda, Mahesana, Narmada, Navsari, Panchmahal, Patan, Porbandar, Rajkot, Surat, Surendranagar, Valsad
Haryana	N	Low	Bhiwani, Faridabad, Fatehbad, Gurgaon, Hisar, Jhajjar, Jind, Kaithal , Karnal, Kurukshetra, Mahendragarh, Panchkula, Panipat, Rwari, Sirsa, Sonipat, Yamunagar
		Medium	Rohtak
		High	
	P	Low	Bhiwani, Faridabad, Fatehbad, Gurgaon, Hisar, Jhajjar, Jind, Kaithal , Karnal, Kurukshetra, Panchkula, Panipat, Rwari, Sirsa, Sonipat, Yamunagar
		Medium	Mahendragarh, Rohtak
		High	
	K	Low	
		Medium	Faridabad, Gurgaon, Hisar, Karnal, Panchkula, Rohtak, Rwari, Yamunagar
		High	Bhiwani, Fatehbad, Jhajjar, Jind, Kaithal, Kurukshetra, Mahendragarh, Panipat, Sirsa, Sonipat
Himachal Pradesh	N	Low	
		Medium	Hamirpur. Kangra, Mandi, Una
		High	Chamba, Kinnaur, Kulu, Lahaul spiti, Simla, Sirmour, Solan
		Low	Hamirpur, Kangra, Mandi Simla, Una

	P	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	
Jhar-khand	N	Low	Lohardaga, Simdega
		Medium	Chatra, Deogarh, Dhanbad, Dumka, East Singhbhum, Garhwa, Giridih, Godda, Gumla, Hazaribagh, Jamtara, Koderma, Latechar, Pakur, Palamu, Ranchi, Sahebganj Sarailela, West Singhbhum
		High	
	P	Low	Cahtra, Dhanbad, Dumka, East Singhbhum, Giridih, Godda, Gumla, Hazaribagh, Jamtara, Koderma, Pakur, Palamu, Sahebganj, Sarailela, Simdega, West Singhbhum
		Medium	Deogarh, Dumka, Koderma, Latechar, Simdega
		High	Lohardaga
	K	Low	
		Medium	Chatra, Dhanbad, East Singhbhum, Garhwa, Giridih, Goodda, Gumla, Hazaribagh, Jamtara, Koderma, Pakur, Palamu, Sahebganj, Sarailela, Simdega, West Singhbhum
		High	Deogarh, Dumka, Koderma, Latechar, Simdega
Karnataka *	N	Low	Kolar
		Medium	Bangalore®, Bangalore (u), Bellari, Bidar, Bijapura, Chitradurga, Davanagere, Gulburga, Hassan, Mysore, Raichur, Shimoga, Tumkur
		High	Belagaum, Chamrajnager, Chikkamagalore, Coorg, Dharwad, Gadag, Haveri, Kodagi, Mandya, North Kannada, South Kannada, Udupi
	P	Low	Bellari, Bijapura, Hassan, North Kannada, South Kannada, Udupi
		Medium	Bangalore (u), Belagaum, Bidar, Chikkamagalore, Chitradurga, Coorg, Dharwad, Gadag, Gulburga, Haveri, Kodagi, Kolar, Mysore, Raichur, Shimoga, Tumkur
		High	Bangalore ®, Chamrajnager, Davanagere, Mandya
	K	Low	South Kannada, Udupi
		Medium	Chikkamagalore, Kolar, Mandya, North Kannada, Shimoga
		High	Bangalore ®, Bangalore (u), Belagaum, Bellari, Bidar, Bijapura, Chamrajnager, Chitradurga, Coorg, Davanagere, Dharwad, Gadag, Gulburga, Hassan, Haveri, Kodagi, Mysore, Raichur, Tumkur
Kerala *	N	Low	Kasaragode, Kollam, Thiruvananthapuram
		Medium	Ernakulam, Idukki, Kannur, Kottayam, Kozhikkode, Malappuram, Palakkad, Pathanamthitta, Thrissur
		High	Wyandu
	P	Low	
		Medium	Idukki, Kannur, Kasaragode, Kozhikkode, Malappuram, Palakkad, Pathanamthitta, Thrissur, Wyandu
		High	Ernakulam, Kollam, Kottayam, Thiruvananthapuram,
		Low	
Kerala *	K	Medium	Idukki, Kannur, Kasaragode, Kollam, Kottayam, Kozhikkode, Malappuram, Pathanamthitta, Thiruvananthapuram, Thrissur, Wyandu
		High	Ernakulam, Palakkad
Maha-rashtra	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, Singhudurg, Thane
		High	
	P	Low	Akola, Amaravati, Aurangabad, Bhandara, Buldhana, Dhule, Gondiya, Hingoli, Jalgaon, Jalna, Kolhapur, Latur, Nagpur, Nanded, Nandurbar, Nashik, Parbhani, Pune, Raigad, Ratnagiri, Sangali, Satara, Singhudurg,

			Solapur, Usmanabad, Wardha, Washim, Yeotmal
		Medium	Beed, Thane
		High	
	K	Low	Raigad, Sindhudurg
		Medium	Kolhapur, Nashik, 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
Madhya Pradesh	N	Low	Bhind, Chhattarpur, Daria, Gwalior, Indore, Japlpur, Mandsaur, Meemuch, Morena, Panna, Ratlam, Sheopu, Shivpuri, Sidhi
		Medium	Anuppur, Bagwai, Balaghat, Betul, Bhopal, Bodwani, Burhanpur, Chhing wara, 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, Chhind wara, Harda, Indore, Khandwa, Khargone, Mandla, Mandsaur, Meemuch, Morena, Narsinghpur, Raisen, Ratlam, Rewa, Sagar, Satna, Seoni, Shahdol, Shajapur, Sheopu, Sidhi, Tikmgarh, Vidisha
		High	Dindori, Guna, Hoshangabad, Rajgarh, Sehore
	K	Low	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, Bodwani, Burhanpur, Chhattarpur, Chhind wara, Dewas, Hoshangabad, Indore, Jhabua, Khandwa, Khargone, Mandsaur, Meemuch, Narsinghpur, Panna, Raisen, Rajgarh, Ratlam, Sehore, Seoni, Shahdol, Shajapur, Sheopu, Ujjain, Vidisha
Orissa *	N	Low	Bhadrak, Boudh, Cuttack, Dhenkanal, Gajapati, Ganjam, Jagatsinghpur, Kalahandi, Kendrapada, Khurda, Mayurbhanj, Naupada, Nayagarh, Phulbani, Puri, Sundargarh
		Medium	Balasore, Bargarh, Bolangir, Deogarh, Jharsuguda, Keonjhar, Koraput, Malkangiri, Nawrangpur, Rayagada, Sambalpur, Sonepur
		High	
Oriissa *	P	Low	Balasore, Bhadrak, Cuttack, Gajapati, Ganjam, Jharsuguda, Keonjhar, Mayurbhanj, Nawrangpur, Phulbani, Sambalpur
		Medium	Bargarh, Bolangir, Boudh, Deogarh, Dhenkanal, Jagatsinghpur, Kalahandi, Kendrapads, 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, Nawrangpur, Puri, Sundargarh
		High	Bolangir, Boudh, Keonjhar, Mayurbhanj, Phulbani, Sambalpur, Sonepur
Punjab	N	Low	Bathinda, Faridkot, Ferozepur, Gurdadpur, Hoshiarpur, Jalandhar, Kapurthala, Ludhiana, Mansa, Moga, Mukatsar
		Medium	Fategar sahib, Nawashahar, Patiala, Ropar, Sangrur
		High	
	P	Low	
		Medium	Faridkot, Ferozepur, Mansa, Mogo, Mukatsar, Nawashahar, Patiala, Sangrur
		High	Bathinda, Fategar sahib, Gurdadpur, Hoshiarpur, Jalandhar, Kapurthala, Ludhiana, Ropar

	K	Low	
		Medium	Hoshiarpur, Ropar
		High	Bathinda, Faridkot, Fetegar sahib, Ferozepur, Gurdadpur, Jalandhar, Kapurthala, Ludhiana, Mansa, Moga, Mukatsar, Nawashahar, Patiala, Sangrur
Rajas-than	N	Low	Alwar, Banswara, Baran, Baratpur, Barmer, Bhundi, Churu, Dausa, Dholpur, Durgapur, Hanumangarh, Jaiselmer, Jalore, Jhunjhun, Jodhpur, Karauli, Kota, Nagpur, Pali, Rajsamand, S Madhopur, Sikar, Sirohi, Sriganganagar, Tonk
		Medium	Bhilwara, Chittorgarh, Jhalawar, Udaipur
		High	
	P	Low	Baratpur, Barmer, Churu, Dausa, Dholpur, Durgapur, Hanumangarh, Jaiselmer, Jalore, Karauli, S Madhopur, Sikar, Sirohi, Sriganganagar
		Medium	Alwar, Banswara, Baran, Bhilwara, Bhundi, Chittorgarh, Jhalawar, Jodhpur, Kota, Nagpur, Pali, Rajsamand, Tonk, Udaipur
		High	
	K	Low	
		Medium	Banswara, Baratpur, Bhilwara, Bhundi, Dholpur, Rajsamand
		High	Alwar, Baran, Barmer, Chittorgarh, Churu, Dausa, Durgapur, Hanumangarh, Jaiselmer, Jalore, Jhalawar, Jhunjhun, Jodhpur, Karauli, Kota Nagpur, Pali, S Madhopur, Sikar, Sirohi, Srigangangar, Tonk, Udaipur
Tamil Nadu	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, Trichirapalli, Vellore, Villupuram, Virdhunagar
		Medium	Salem
		High	Nilgiri
Tamil Nadu	P	Low	Kanchipuram, Sivagangai, Thoothukudi, Trichirapalli
		Medium	Cuddalore, Dharmapuri, Dindigul, Erode, Kanyakumari, Karur, Namakkal, Salem, Salem, Theni, Villupuram, Virudhunagar
		High	Coimbatore, Fudukkottai, Madurai, Nagapattinam, Nilgiri, Peerambalur, Ramanathapuram, Thanjavur, Thiruallur, Thiruvarur, Tiruvannamalai, Tiruvarur, Vellore
	K	Low	
		Medium	Cuddalore. Erode, Kanchipuram, Kanyakumari, Karur, Namakkal, Thiruallur, Villupuram
		High	Coimbatore, Dharmapuri, Dindigul, Fudukkottai, Madurai, Nagapattinam, Nilgiri, Peerambalur, Ramanathapuram, Salem, Salem, Sivagangai, Thanjavur, Theni, Thiruvarur, Thoothukudi, Tiruvannamalai, Tiruvarur, Trichirapalli, Vellore, Virudhunagar
Uttar Pradesh	N	Low	Aazamgarh, Agra, Aligarh, Allahabad, Ambedkarnagar, Auraiya, Badanyu, Baghpat, Bahraich, Baliya, Balrampur, Banda, Barabanki, Bareli, Basti, Bojnaur, Buland Shahar, Chandouli, Chitrakut, Devariya, Eta, Etawa, Faizabad, Farukkhabad, Fatehabad, Gautambhudh nagar, Gazipur, Gaziyabad, Gorakhapur, Hameerpur, Hardoi, Hathras, Jalaun, Jaunpur, Jhashi, Jyotishaphool nagar, Kannauj, Kanpur Dehat, Kanpur Nagar, Kashiram Nagar, Kaushambee, Kushinagar, Lalitpur, Luckhnow, Lukhimpur, Maharajgang, Mahowa, Mainpuri, Mathura, Mau, Meerut, Muradabad, Muzzafar nagar, Peelibhit, Pratapgarh, Rampur, Raybareli, Saharanpur, Santkabeer nagar, Shahjahapur, Sidharth nagar, Sitapur, Sonbhadra, Sribasti, Sultanpur, Unnav, Varanasi
		Medium	Mirzapur, Santravidasnagar
		High	
	P	Low	Aazamgarh, Agra, Aligarh, Allahabad, Ambedkarnagar, Auraiya, Badanyu, Baghpat, Bahraich, Baliya, Balrampur, Banda, Barabanki, Bareli, Basti, Bojnaur, Buland Shahar, Chandouli, Chitrakut, Devariya,

			Eta, Etawa, Faizabad, Farukkhabad, Fatehabad, Firozabad, Gautambhudh nagar, Gazipur, Gaziyabad, Gorakhapur, Hameerpur, Hathras, Jalaun, Jaunpur, Jhashi, Jyotishaphool nagar, Kannauj, Kanpur Dehat, Kanpur Nagar, Kashiram Nagar, Kaushambee, Kushinagar, Lalitpur, Luckhnow, Lukhimpur, Maharajgang, Mahowa, Mainpuri, Mathura, Mau, Meerut, Mirzapur, Muradabad, Muzzafar nagar, Peelibhit, Pratapgarh, Rampur, Raybareli, Saharanpur, Santkabeer nagar, Santravidasnagar, Shahjahapur, Sidharth nagar, Sitapur, Sonbhadra, Sribasti, Sultanpur, Unnav Varanasi
		Medium	Hardoi
		High	
	K	Low	
		Medium	Aazamgarh, Ambedkarnagar, Auraiya, Baghpat, Bahraich, Baliya, Balrampur, Banda, Barabanki, Bareli, Basti, Bojnaur, Chandouli, Chitrakut, Devariya, Etawa, Faizabad, Farukkhabad, Gautambhudh nagar, Gazipur, Gorakhapur, Jyotishaphool nagar, Kannauj, Kanpur Dehat, Kanpur Nagar, Kushinagar, Lukhimpur, Maharajgang, Mahowa, Mathura, Mau, Meerut, Muradabad, Muzzzfar nagar, Peelibhit, Pratapgarh, Rampur, Saharanpur, Santkabeer nagar, Shahjahapur, Sidharth nagar, Sitapur, Sribasti, Sultanpur, Varanasi
Uttar Pradesh		High	Agra, Aligarh, Allahabad, Badanyu, Buland Shahar, Eta, Fatehabad, Firozabad, Gaziyabad, Hameerpur, Hardoi, Hathras, Jalaun, Jaunpur, Jhashi, Kashiram nagar, Kaushambee, Lalitpur, Luckhnow, Mainpuri, Mirzapur, Raybareli, Santravidasnagar, Sonbhadra, Unnav
Uttara-khand	N	Low	Dehradun, Tehari Gadwal, Udhamsingh Nagar, Uttarakashi
		Medium	Chamoli, Champawat, Haridwar, Nanital, Paudi, Rudraprayag
		High	Bageswar, Pithoragad
	P	Low	Bageswar, Chamoli, Champawat, Dehradun, Haridwar, Paudi, Rudraprayag, Udhamsingh Nagar, Uttarakashi
		Medium	Nanital, Pithoragad, Tehari Gadwal
		High	
	K	Low	
		Medium	Dehradun, Haridwar, Paudi, Pithoragad, Rudraprayag, Tehari Gadwal, Udhamsingh nagar, Uttarakashi,
		High	Bageswar, Chamoli, Champawat, Nanital
West Bengal	N	Low	Midnapore E, Midnapore W, North 24-Parganas, South 24-Parganas
		Medium	Darjeeling, Hooghly, Jalpaiguri, Nadia, Prakama, Purulia
		High	
	P	Low	Midnapore E, Prakama, Purulia
		Medium	Darjeeling, Jalpaiguri, Midnapore 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	

Annexure – III C

CONSUMPTION OF FERTILISER NUTRIENTS BY 1ST 100 DISTRICTS

2001-02				2008-09			
Sl. No.	Districts	States	Consumption (tonnes) ($N+P_2O_5+K_2O$)	Sl. No.	Districts	States	Consumption (tonnes) ($N+P_2O_5+K_2O$)
1	Ferozepur	Punjab	179,601	1	Guntur	Andhra Pradesh	288,207
2	Krishna	Andhra Pradesh	177,713	2	West Godavari	Andhra Pradesh	272,323
3	Guntur	Andhra Pradesh	171,944	3	Jalgaon	Maharashtra	223,633
4	West Godavari	Andhra Pradesh	171,002	4	Karimnagar	Andhra Pradesh	220,179
5	East Godavari	Andhra Pradesh	146,987	5	Krishna	Andhra Pradesh	209,255
6	Amritsar	Punjab	142,306	6	Kurnool	Andhra Pradesh	208,004
7	Ludhiana	Punjab	132,666	7	Nalgonda	Andhra Pradesh	200,715
8	Karimnagar	Andhra Pradesh	129,587	8	Belgaum	Karnataka	200,545
9	I	Andhra Pradesh	124,967	9	Burdwan	West Bengal	193,689
10	Burdwan	West Bengal	124,267	10	Rajkot	Gujarat	187,491
11	Ahmednagar	Maharashtra	123,285	11	Ferozepur	Punjab	185,419
12	Karnal	Haryana	115,105	12	East Godavari	Andhra Pradesh	179,857
13	Jalgaon	Maharashtra	114,889	13	Ahmednagar	Maharashtra	166,971
14	Belgaum	Karnataka	114,572	14	Warangal	Andhra Pradesh	165,758
15	Shahjahanpur	Uttar Pradesh	111,310	15	Pune	Maharashtra	160,022
16	Muzaffarnagar	Uttar Pradesh	110,456	16	Nanded	Maharashtra	159,561
17	Raichur	Karnataka	109,103	17	Nasik	Maharashtra	159,447
18	Bellary	Karnataka	107,224	18	Sangrur	Punjab	157,763
19	Hooghly	West Bengal	107,131	19	Ludhiana	Punjab	152,165
20	Warangal	Andhra Pradesh	105,855	20	Solapur	Maharashtra	151,730
21	Nalgonda	Andhra Pradesh	104,592	21	Bellary	Karnataka	150,917
22	Renga Reddy	Andhra Pradesh	103,284	22	Nizamabad	Andhra Pradesh	150,731
23	Moga	Punjab	103,260	23	Hooghly	West Bengal	147,402
24	Kheri	Uttar Pradesh	102,696	24	Murshidabad	West Bengal	144,638
25	Nanded	Maharashtra	99,665	25	Shahjahanpur	Uttar Pradesh	141,960
26	Surat	Gujarat	99,122	26	Prakasam	Andhra Pradesh	140,489
27	Nasik	Maharashtra	99,119	27	Sangli	Maharashtra	138,835
28	Pune	Maharashtra	98,595	28	Nellore	Andhra Pradesh	138,032
29	Moradabad	Uttar Pradesh	97,148	29	Raichur	Karnataka	136,430
30	Sirsa	Haryana	96,357	30	Surat	Gujarat	135,683
31	Solapur	Maharashtra	93,958	31	Patiala	Punjab	132,383
32	Sangrur	Punjab	92,567	32	Satara	Maharashtra	132,164
33	Kolhapur	Maharashtra	92,134	33	Sirsa	Haryana	130,957
34	Prakasam	Andhra Pradesh	91,737	34	Midnapur(W)	West Bengal	129,003
35	Bareilly	Uttar Pradesh	91,469	35	Khammam	Andhra Pradesh	128,257
36	Allahabad	Uttar Pradesh	90,869	36	Jalna	Maharashtra	126,295
37	Midnapur(W)	West Bengal	86,163	37	Karnal	Haryana	123,488
38	Sitapur	Uttar Pradesh	84,929	38	Aurangabad	Maharashtra	120,124
39	Patiala	Punjab	84,901	39	Bhatinda	Punjab	116,875
40	Bulandshahar	Uttar Pradesh	84,808	40	Allahabad	Uttar Pradesh	115,622
41	Midnapur(E)	West Bengal	84,279	41	Gulbarga	Karnataka	114,730
42	Sangli	Maharashtra	81,799	42	Tiruchirapalli	Tamil Nadu	113,266
43	Kaithal	Haryana	81,480	43	Kheri	Uttar Pradesh	112,820
44	Badaun	Uttar Pradesh	80,352	44	Moradabad	Uttar Pradesh	112,472
45	Basti	Uttar Pradesh	78,880	45	Bhavnagar	Gujarat	110,450

46	Nizamabad	Andhra Pradesh	78,154
47	U.S. Nagar	Uttranchal	78,119
48	Jalandhar	Punjab	77,736
49	Bhatinda	Punjab	77,468
50	Nellore	Andhra Pradesh	77,427
51	Gurdaspur	Punjab	76,536
52	Sonipat	Haryana	76,376
53	Saharanpur	Uttar Pradesh	75,372
54	Pilibhit	Uttar Pradesh	74,280
55	24-Parganas(N)	West Bengal	74,195
56	Barabanki	Uttar Pradesh	72,511
57	Tiruchirapalli	Tamil Nadu	72,389
58	Khammam	Andhra Pradesh	71,766
59	Deoria	Uttar Pradesh	71,372
60	Davanagere	Karnataka	71,294
61	Sriganganagar	Rajasthan	69,831
62	Hisar	Haryana	69,309
63	Mukatsar	Punjab	68,570
64	Birbhum	West Bengal	68,559
65	Villupuram	Tamil Nadu	68,506
66	24-Parganas(S)	West Bengal	68,213
67	Satara	Maharashtra	67,958
68	Dinajpur(U&D)	West Bengal	67,894
69	Rajkot	Gujarat	67,652
70	Kurukshetra	Haryana	67,417
71	Anantapur	Andhra Pradesh	67,064
72	Mandya	Karnataka	67,024
73	Bijnor	Uttar Pradesh	66,578
74	Howrah	West Bengal	66,120
75	Jind	Haryana	66,112
76	Meerut	Uttar Pradesh	65,152
77	Coochbehar	West Bengal	64,559
78	Banaskantha	Gujarat	64,254
79	Jalna	Maharashtra	63,868
80	Gulbarga	Karnataka	63,609
81	Thanjavur	Tamil Nadu	63,452
82	Buldhana	Maharashtra	63,192
83	Fatehabad	Haryana	62,130
84	Ropar	Punjab	61,626
85	Yeotmal	Maharashtra	61,266
86	Coimbatore	Tamil Nadu	60,881
87	Faizabad	Uttar Pradesh	60,320
88	Mehabubnagar	Andhra Pradesh	59,449
89	Erode	Tamil Nadu	59,292
90	Gorakhpur	Uttar Pradesh	59,014
91	Nadia	West Bengal	58,978
92	Murshidabad	West Bengal	58,848
93	Sabarkantha	Gujarat	58,680
94	Vadodara	Gujarat	58,638
95	Jalpaiguri	West Bengal	58,311
96	Aurangabad	Maharashtra	58,000
97	Aligarh	Uttar Pradesh	57,812
98	Bankura	West Bengal	57,470
99	Ghazipur	Uttar Pradesh	57,198
100	Etah	Uttar Pradesh	56,717
Total consumption by 100 districts			**8,578,651**
% share to total consumption			**49.4%**

46	U.S. Nagar	Uttarakhand	107,865
47	Junagadh	Gujarat	106,871
48	Jalandhar	Punjab	106,458
49	Banaskantha	Gujarat	106,125
50	Mandya	Karnataka	105,878
51	Buldhana	Maharashtra	105,404
52	Gurdaspur	Punjab	105,117
53	Vadodara	Gujarat	104,148
54	Mahaboobnagar	Andhra Pradesh	103,394
55	Sitapur	Uttar Pradesh	103,182
56	Muktsar	Punjab	102,065
57	Hisar	Haryana	101,707
58	Amritsar	Punjab	101,679
59	Malda	West Bengal	101,383
60	Raipur	Chhattisgarh	100,629
61	Adilabad	Andhra Pradesh	99,333
62	Nadia	West Bengal	98,869
63	Bareilly	Uttar Pradesh	98,514
64	Muzaffarnagar	Uttar Pradesh	97,505
65	Fatehabad	Haryana	97,459
66	Anantapur	Andhra Pradesh	97,433
67	Kurukshetra	Haryana	97,250
68	Davanagere	Karnataka	96,578
69	Sabarkantha	Gujarat	96,489
70	Bulandshahar	Uttar Pradesh	95,685
71	Rangareddy	Andhra Pradesh	94,383
72	Gorakhpur	Uttar Pradesh	93,708
73	Jind	Haryana	93,679
74	Pilibhit	Uttar Pradesh	93,423
75	Moga	Punjab	93,419
76	Kadapa	Andhra Pradesh	92,194
77	Barabanki	Uttar Pradesh	92,134
78	Medak	Andhra Pradesh	91,121
79	Sriganganagar	Rajasthan	89,475
80	Kanpur (Nagar)	Uttar Pradesh	89,005
81	Kaithal	Haryana	88,829
82	Birbhum	West Bengal	87,924
83	Anand	Gujarat	87,586
84	Erode	Tamil Nadu	87,576
85	Hardoi	Uttar Pradesh	87,507
86	Ahmedabad	Gujarat	86,896
87	Midnapur(E)	West Bengal	86,687
88	Surendranagar	Gujarat	86,500
89	Bijnor	Uttar Pradesh	86,217
90	Salem	Tamil Nadu	86,048
91	Meerut	Uttar Pradesh	85,997
92	Faridabad	Haryana	84,209
93	Etah	Uttar Pradesh	83,840
94	Uttar Dinajpur	West Bengal	83,277
95	N. 24-Parganas	West Bengal	82,719
96	Kolhapur	Maharashtra	82,639
97	Koppal	Karnataka	82,183
98	Jalpaiguri	West Bengal	81,836
99	Sonipat	Haryana	81,753
100	Aligarh	Uttar Pradesh	81,168
Total consumption by 100 districts			**12,247,707**
% share to total consumption			**49.2%**

Annexure - IV A

Statement Showing State wise Number of Soil Testing Laboratories, Analyzing capacity, and Utilization during 2008-09 under State Governments/UTs and Fertilizer Industry

SNo	Name of the State	No of Soil Testing Laboratories							Annual Capacity (in lakhs)	Sample Analyzed (in lakhs)	percent
		State Govt		Fert. Industry		Total					
		Static	Mobile	Static	Moblie	Static	Mobile	Total			
1	**Andhra Pradesh**	**80**	**4**	**2**	**0**	**82**	**4**	**86**	**4.38**	**4.55**	**7.46**
2	Karnataka	20	3	1	1	21	4	25	2.64	1.60	2.62
3	Kerala	14	9	1	0	15	9	24	3.67	2.36	3.87
4	**Tamil Nadu**	**19**	**16**	**1**	**1**	**20**	**17**	**37**	**8.34**	**7.20**	**11.80**
5	Pondicherry	2	0	0	0	2	0	2	0.04	0.06	0.10
6	A&N Island	1	1	0	0	1	1	2	0.12	0.07	0.11
7	**Gujarat**	**22**	**1**	**3**	**1**	**25**	**2**	**27**	**2.40**	**3.12**	**5.11**
8	M.P	27	6	0	3	27	9	36	3.56	2.00	3.28
9	Maharashtra	29	0	6	4	35	4	39	2.25	2.62	4.29
10	**Rajasthan**	**21**	**12**	**1**	**0**	**22**	**12**	**34**	**3.75**	**3.29**	**5.39**
11	Chhattisgarh	5	4	0	0	5	4	9	0.65	0.41	0.67
12	Goa	1	1	0	0	1	1	2	0.25	0.18	0.29
13	Haryana	30	0	0	0	30	0	30	3.08	2.06	3.38
14	**Punjab**	**54**	**3**	**0**	**1**	**54**	**4**	**58**	**5.56**	**3.82**	**6.26**
15	H.P	11	2	0	0	11	2	13	1.25	1.22	2.00
16	**Uttar Pradesh**	**73**	**18**	**4**	**4**	**77**	**22**	**99**	**21.39**	**21.61**	**35.41**
17	J&K	12	4	0	0	12	4	16	0.74	0.4	0.66
18	Uttaranchal	13	2	0	0	13	2	15	0.85	0.61	1.00
19	Delhi	1	0	0	0	1	0	1	0.01	0.01	0.02
20	Bihar	39	0	0	0	39	0	39	2.00	1.03	1.69
21	Orissa	11	0	0	0	11	0	11	1.20	1.15	1.88
22	West Bengal	10	8	0	0	10	8	18	1.26	0.41	0.67
23	Jharkhand	7	0	0	0	7	0	7	0.39	0.12	0.20
24	Assam	8	4	0	0	8	4	12	1.06	0.59	0.97
25	Tripura	2	4	0	0	2	4	6	0.21	0.12	0.20
26	Manipur	3	1	0	0	3	1	4	0.2	0.01	0.02
27	Nagaland	3	0	0	0	3	0	3	0.45	0.12	0.20
28	Arunachal Pradesh	1	1	0	0	1	1	2	0.05	0.04	0.07
29	Meghalaya	1	1	0	0	1	1	2	0.1	0.10	0.16
30	Sikkim	1	0	0	0	1	0	1	0.08	0.08	0.13
31	Mizoram	1	0	0	0	1	0	1	0.08	0.07	0.11
GRAND TOTAL		**522**	**105**	**19**	**15**	**541**	**120**	**661**	**72.01**	**61.03**	100.00

Annexure – IV B

Summary of Physical and Financial Requirements during 11th Five Year Plan

(Rs. in crore)

	Particulars	Nos.	Rate	Amount
I	**Strengthening of Soil Testing Laboratories (STLs)**			
1	Setting up of additional soil testing laboratories by Agri clinics /NGOs/Cooperative, Private entrepreneurs, etc. under Public Private Partnership mode	500	@50% of project cost limited to maximum of Rs.30 lakh as one time subsidy	150.00
2	Strengthening of 315 State STLs having no micronutrient analysis facility	315	@ Rs. 10 lakh/lab	31.50
3	Capacity building through training of STL staff/ Extension officers/farmers and field demonstration/Work Shop etc. on balanced use of fertilizer by State Governments/ICAR / SAUs / Fertilizer Industry	-	-	15.00
4	Creation of data bank for site specific Balanced Use of Fertilizers			5.00
5	Adoption of village by STLs (10 villages each) through Frontiline Field Demos, (FFD) by 800 STLs	8000 villages	@ Rs.20,000/- per FFD	16.00
6	Preparation of digital district soil maps & GPS based soil fertility monitoring by ICAR / SAUs	500	@ Rs. 2 lakh/district	10.00
	TOTAL I			**227.50**
II	**Promoting Use of Integrated Nutrient Management**			
1	Promotion of organic manures	0.5 mha	@ Rs.500/ha	25.00
2	Promotion of soil amendments (lime/basic slag) in acidic soils	0.5 mha	@Rs.500/ha @ 25% of cost	25.00
3	Promotion & distribution of micronutrients	0.5 mha	@Rs.500/ha	25.00
	TOTAL II			**75.00**
III.	**Strengthening of Fertilizer Quality Control Laboratories**			
1	(a) Continuation of CFQC&TI/Regional Labs (b) Strengthening of CFQC&TI/Regional Labs including setting up of 4 new Regional Labs	- -	-	9.60 12.00
2	Strengthening/upgradtion of existing state fertilizer quality control labs	63	@Rs.25 lakh each	15.75
3	Setting up of New Fertilizer Quality Control Labs by State Governments	20	@Rs.50 lakh	10.00
4	Setting up of fertilizer testing labs under private/co-operative sector for advisory purposes	50	@ 25% of the project cost or Rs.10.00 lakh as one time back ended subsidy	5.00
	TOTAL III			**52.35**
IV	**Strengthening of Mobile Soil Testing Laboratories (STLs)**			
1	Setting up of Mobile Soil Testig Laboratories by Agri clinics / NGOs / Coooperative, Private entrepreneurs, etc. under Public Private Partnership mode	250	@75% of project cost limited to maximum of Rs.30 lakh as one time subsidy	75.00
	TOTAL IV			**75.00**
	GRAND TOTAL (I+II+III+IV)			**429.85**

Abbreviations Used

A/S	Ammonium Sulphate
AICRP	All India Coordinated Research Project
APMC	Agricultural Produce Market Committee
ATMA	Agriculture Technology Management Agency
BDS	Block Delivery Scheme
BICP	Bureau of Industrial Coasts and Prices
CAGR	Compound Annual Growth Rate
CAN	Calcium Ammonium Nitrate
CBM	Coal bed methane
CFR	Cost and Freight
DAP	Di-Ammonium Phosphate
DOF	Department of Fertilizers
ECA	Essential Commodities Act
ERC	Expenditure Reforms Commission
FAI	Fertilizer Association of India
FCO	Fertiliser Control Order
FDCR	Feedstock Differential Cost Reimbursement
FO	Fuel Oil
FQCLs	Fertiliser Quality Control Laboratories
FUE	Fertiliser Use Efficiency
FYM	Farm Yard Manure
GIS	Geographical Information System
GOI	Government of India
GPS	Global Positioning System
HPC	High Powered Fertilizer Pricing Policy Review Committee
ICAR	Indian Council of Agricultural Research
IFA	International Fertilizer Industry Association
IISS	Indian Institute of Soil Science
INM	Integrated Nutrient Management
IPP	Import Parity Price
JV	Joint Venture
K_2O	Potassium
LCC	Leaf Colour Chart
LNG	Liquefied Natural Gas
LSHS	Low Sulphur Heavy Stock
MAP	Mono Ammonium Phosphate
MOP	Muriate of Potash
N, P & K	Nitrogen, Phosphorus, Potassium
NADEP	National Agribusiness Development Programme
NBS	National Bureau of Statistics
NBS	Nutrient Based Subsidy
NPMSF	National Project on Management of Soil Health and Fertility
NPS	New Pricing Scheme
NRP	Normative Referral Price
OC	Organic carbon
P_2O_5	Phosphorus
PPP	Point-to –Point Protocol
RPS	Retention Price Scheme
S	Sulphur
SAUs	State Agricultural Universities
SSNM	Site Specific Nutrient Management
SSP	Single Super Phosphate
STLs	Soil Testing Laboratories
TC	Tariff Commission
TSI	The Sulphur Institute
TSP	Triple Super Phosphate
Zn	Zinc
IPQC	In process quality control
RKVY	Rashtriya Krishi Vikas Yojana
NFSM	National Food Security Mission