

WORKSHOP ON  
SOIL FERTILITY MANAGEMENT PROGRAM  
AND WORKING PROCEDURE

ORGANIZED BY  
DOA/CDD/STSS/JICA

24 DEC. 1997

**Proceedings of the  
Workshop on Soil Fertility Management Program  
and Working Procedure**

**Held at DOA, Harihar Bhavan,  
Lalitpur.**

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## **1. Introduction**

Annual production growth rate over the period of 1980/81 to 1990/91 has been 2.3% per year for food grain and 2.2% per year for cash crop. During the same period population growth rate has been estimated to be 2.5% per annum or 0.2% higher than the food grain production rate. This increase in food production is also mainly attributed to an increase in the land area rather than increase in productivity of land. Since the increase in land is a lesser chance in the future, the productivity increase is the only option. National policy is to increase productivity to meet the demand of increasing population. Soil fertility improvement is one of the important factors in increasing productivity. DOA has the responsibility to transfer the agriculture technology to the farmers. STSS (Soil Testing and Service Section) at the Central Level and five Regional labs (RSTL) in the respective regions were established in 1992 in order to perform the soil fertility management activities and support agriculture development in country. Appropriate Soil Management Action Programs and their Working Procedure are very important to have uniformity and effective launching of programs and to have good impact on soil fertility status of the country. Thus a one day workshop on the soil fertility management program and working procedure was organized on 24th December. The soil scientists from STSS, RSTL and CADO from Dang, were the participants and participated lively in discussion. Other higher officials of CDD, DOA and MOA and even from the NARC were invited, their valuable suggestions and comments were special input in the discussion.

## **2. Objective of Workshop**

- To find out appropriate soil fertility management action programs in districts and their working procedure for effective launching of the programs.

- To have a panel of discussion and interaction among soil scientists of the DOA and find out the ways to improve the working environment of them and thereby get the better output from them in soil management activities.

### **3. Welcome and introduction of on going programs**

**- S. N. Jaishy**

Chief of the Soil Testing and Service Section

Honorable chair person, ladies and gentlemen, first of all, on the behalf of DOA/CDD/JICA and from myself, I would like to extend a hearty welcome to all who have come to attend this workshop. This is a great pleasure for us to have a valuable gathering for the development of soil management working procedure for the first time in Nepal. I hope this gathering will achieve the objective of workshop and specify soil fertility management activities needed, future strategy, constraints and the recommended work.

Our organization (STSS and RSTLs) was established in 1992 to support agricultural development in the country. These are made capable to launch many programs. They are:

- ◆ Soil analysis,
- ◆ Soil survey and mapping,
- ◆ Soil fertility related programs
- ◆ Monitoring of the works launched by DADO and RSTL
- ◆ Training for officer, JT/JTA, and farmer, on soil Management and other soil related activities.
- ◆ Study on manures and fertilizer materials used by the farmers
- ◆ Study on micronutrient-deficient areas.
- ◆ Demonstration on manure and fertilizer

- ◆ Soil campaign
- ◆ Publication etc.

Programs could not be conducted effectively if impact oriented, rather they are target oriented due to following constraints.

- Lack of required work force as well as skilled man power
- Lack of physical facility
- Defective organizational set up and work force (inverted pyramid)
- Dual supporting policy for RSTL.
- Our farmers are poor, they have small land holding and they have low buying capacity of fertilizer and manure
- Timely unavailability of chemical fertilizer and high cost
- Depletion of natural resources
- Lack of institution to regulate the production, supply, distribution of IPNS input.
- Lack of soil unit or soil related manpower responsible for programs in the district.

These above mentioned constraints are some examples that are obstacles for the efficient program launching.

In the agricultural production point of view, we have to support equally agronomy, horticulture and animal food (forage, fodder, and pasture) but we are too weak to support all these programs because we have no man power. At present our monitoring procedure is also not satisfactory. A need of well developed procedure DADO level is realized.

- ◆ Farmers are demanding appropriate recommendation for manures and fertilizer for all crops as well as tree plants but our fertilizer rating is too old and needs to be updated

- ✦ Micronutrients deficiency is common but still analysis work is not launched.
- ✦ Sustainability of soil fertility and productivity is the basic requirement for the production. So sustainable soil fertility management programs have to be launched.

At present we have many problems but we can manage the soil fertility by developing sustainable soil fertility programs. Soil erosion is one of the main causes of soil fertility declining. A loss of only 1mm top soil (a minimum that would occur) on marginalised land can be translated into the loss of 10 kg of nitrogen, 7 kg of phosphorus, 15 kg of potassium per hectare (Carson, 1992). So soil conservation farming programs are suitable in such areas. We can reduce the loss of nutrients from the system by reducing the surface erosion, Some examples are given as below :

- ✦ Reduce volatilization of nutrients from the system.
- ✦ Develop the alternative fuel to dung in Tarai and in the Dun valleys.

It is assumed that 8 million tons of dung is burnt in Nepal. If this can be stopped roughly 100,000 Mt. plant nutrients(NP) can be saved. It amounts to one fifth of total crop's removal approximately 500,000 metric tons (Joshy et al.). And 1.3 times more than the present fertilizer NPK import value (75,000 Mt. in 1992/93). So by enhancing the save the dung programs such losses can be prevented.

- ✦ Reduce the loss of nutrients from night soil

The average household produces 28 kg of nitrogen, 4 kg of phosphorus and 8 kg of potassium as organic waste and, through lack of care, a significant portion of these nutrients is lost from the system. If only 50% of the nutrients are recycled on to farm land (by chance or design) this would result in an additional 70,000 tons of elemental nutrients available for the production system. At present, Nepal

only imports 50,000 tons of elemental nitrogen, phosphorus and potassium (Carson. 1992). But in our country the use of night soil is very negligible (almost not in use). An awareness program at the farmer's level will be beneficial.

- ❖ Improve the efficiency of nutrient use like quality, quantity increase of compost use
- ❖ Desertification problems are also pointed out in many scientific reports (in Dolpa). In such areas some special programs should be developed.
- ❖ Use of crop residue.

About 14.9% crops' residue is used as a fuel. According to WECS (1994), agricultural residue and animal waste production for 1993 estimated to be 11.0 million tons each. All these good sources of organic matter are converting into fuel.

By converting this agricultural waste system, agro-industrial waste system and municipal waste system into fuel and manure, such losses can be prevented.

### **Legume rotation and use of bio-fertilizer programs.**

Legumes are grown in approximately 262,000 ha in Nepal but cultural treatment, still, are not popularized. At least one rotation in a year or mixed or relay with cereal by using cultural treatment will be beneficial for symbiotic nitrogen fixation. The above mentioned activities are some of the needed activities.

So our programs must be enhanced according to farmers' needs and appropriate to the location for soil fertility improvement.

Lastly, again, I would like to heartily welcome you all.

Thank you.



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- ✦ Carson, Brian (1992) The Land The farmer and the Future, ICIMOD, occasional paper No. 21 Kathmandu, Nepal.
- ✦ Joshy. D., S.P Pandey and RC Munankarmy 1992, The role of integrated plant nutrient system in sustainable and environmentally sound agricultural development, RAPA publication 1993/13
- ✦ Pandey S.P. Extension of Integrated Plant Nutrition System (IPNS) at farm level in Nepal RAPA publication 1995/12
- ✦ Biogas Tecnology manual For extension Nepal September 1996 FAO/TCP/ Nepal/4451-7, Consolidated management services Nepal (p) LTD

## 4. Direction Speech

Valuable direction and suggestion delibered by high officials.

### 4.1 Mr. Surya Nath Upadhayaya, Secretary, MOA

He has suggested emphasizing on following programs

- ❖ Awareness Training to farmers and technicians on soil management .
- ❖ Land use planning
- ❖ Quality control of fertilizer.

He put forth the view that the future of the country depends on the effort and hard work of the technicians

### 4.2 Mr. J. C. Gautam, Special Secreatary, MOA.

He has suggested emphasizing on following aspects:

30,000mt soil is eroded every year and 600 mt nutrient is lost every year. Saving of this loss of nutrients is very important. Conserving nutrients results in lesser demand of fertilizer. Thus we should carry out conservation farming in farmers field and show the importance of them. Tie up with NARC, close working linkages is equally important.

#### **4.3 Mr A.K. Rai, Joint Secretary**

He has suggested to emphasize proper use of the analyzed result, strengthening of lab and quality control of fertilizer. Demand and supply of fertilizer should be estimated constantly.

#### **4.4 Mr. Tek Bahadur shrestha, Director General, DOA**

He has suggested to emphasize on following programs

- ❖ We should develop programs in soil fertility management for the suitable agriculture.
- ❖ There are loopholes in the structure of DOA, which create imbalance and need to be updated according to the need and situation.
- ❖ There is a limited number of soil scientists under DOA, thus it's difficult to cover Soil fertility development programs in the country, thus for the time being, Agronomists need to be utilized for launching of soil programs too.
- ❖ Based on the need and situation of the country, manpower structure needs to be proposed and if that is forwarded to DOA, that would be forwarded for further action.

#### **4.5 Mr. Tek Bahadur Thapa, Deputy Director General, DOA**

(Chairperson's remark)

He has suggested to list ongoing programs, existing problems and remedies. Then develop short term, medium term and long term action programs based on feasibility and need of the farmers and the country.

#### **4.6 Mr. D. Joshy, Executive Director, NARC**

Fertility depletion is the burning issue in the field of agriculture. This problem can not be solved by an isolated approach, it needs an integrated approach. It is a challenge for both researchers and development workers. Organic matter depletion is one of the important problems. In the past, we have had experience in compost as well as green manuring programs. Thus effective launching of the program in the integrated form should include:

- ❖ Study of Farming system
- ❖ Indigenous fertility management
- ❖ Proper use of the research results
- ❖ Time and resources saving by using already available database from NARC

#### **5. Vote of thanks by G.P.Pandey, Chief., Crop Development Division**

According to Mr Pandey, Soil is the basis for crop production, thus without giving importance to soil fertility, increase in crop production can not be achieved. He emphasized the need of the development of organizational set up of soil science faculty under DOA.

He has heartily thanked the Secretary, MOA for his valuable comments and suggestions and for accepting the invitation in spite of his very busy schedule. He has also heartily thanked the Special Secretary, MOA, Director General, DOA,

Deputy Director General, DOA, Joint Secretary, MOA, Executive Director, NARC for their valuable comments and suggestions to the participants. Their guidance would surely encourage the participants in their duty. He has given special thanks to Mr S.L. Chaudhary, CADO, Dang, and also thanked all the participants for participating lively and actively in discussion and making the workshop successful.

## **6. Summary Presentation**

### ***Existing Programs:***

#### **Soil Testing and Service Section**

1. Supervision, monitoring and follow up
2. Field survey and preparation of soil fertility map
3. Soil analysis
4. Subject matter training to officials

#### **Regional Soil Labs :**

- a. Jhumka, Sunsary in Eastern region
- b. Trishuli, Nuwakot in central region
- c. Khairanitar, Tanahu in Western region
- d. Khajura, Banke in Mid Western region
- e. Dhangadi, Kailali in Far Western region

#### **Programs by RSTL :**

- Soil analysis and fertilizer recommendation
- Monitoring and supervision
- Demonstration
- Soil campaign

## Major soil fertility problems and their remedies

Problems	Remedies
pH correction	Soil test campaign proper use of lime
Decreasing trend of organic matter (For better soil chemical, physical and biological condition)	Balanced use of fertilizers Proper use of biogas slurry Change in cropping pattern
Soil Pollution (Problematic soil needs long time even hundred or thousand years in reclamation) and national economy	Integrated Plant Nutrient System. Use of quality fertilizers Control in haphazard use of micronutrients containing fertilizers.
Lack of soil fertility map	Conduct soil survey (which districts not covered by NARC) Take soil survey information from NARC and use further
Micronutrient deficiency	study of farmers's fields Create awareness of the farmers on their use.

## **Future Strategy :**

- ❖ Formulation of programs to address soil management tied with agriculture productivity and profitability of the farming system.
- ❖ Separate soil management strategies for subsistence and commercial agriculture as APP dictated.
  - (i) "Demand driven" Production system of less accessible hills and mountains is supported by the improvement of their traditional integrated system of agriculture, livestock and forest.
  - (ii) "Technolog driven" green revolution has been emphasized on the Tarai and in the easily accessible valley of Nepal by supporting mass scale of green manuring and use of bio-fertilizers, where manure and compost is scarce.
- ❖ Soil management program needs to focus on the small farmers
- ❖ Promote Integrated Plant Nutrient System (IPNS) technologies to the farmers

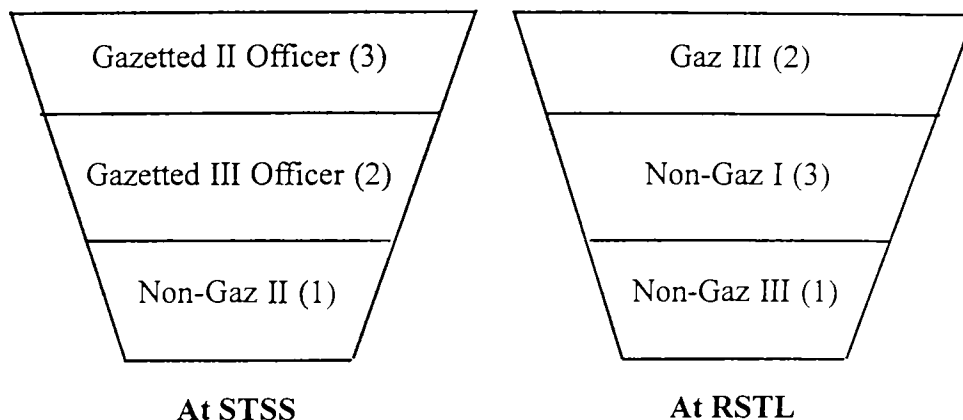
## **Action Program :**

- ❖ Land evaluation and land suitability classification from crop production point of view.
- ❖ Creation and preservation of soil and agro-ecological database based on survey, resource monitoring and land evaluation studies.
- ❖ Technology transfer and demonstrations regarding macro and micronutrient fertilizers, green manure, compost, agriculture lime and new fertilizer materials in IPNS concept.

- ❖ Formulation and execution of soil conservation program in farmer's cultivated land.
- ❖ Soil analysis in the laboratories, based on systematic sampling techniques to support soil survey, soil monitoring and mass scale soil services.
- ❖ Promote soil SIBIR (campaign) and MATO SAPTAH in quantitative and qualitative basis to provide field level soil services.
- ❖ Study of fertilizer standards and formulation of fertilizer act
- ❖ Fertilizer monitoring and quality control
- ❖ Conduct various soil based training for manpower development.
- ❖ Coordinate the soil laboratories for program planning and monitoring.

## Constraints :

### 1. Defective Organizational Setup and manpower



2. Among the existing eight technical faculties, Soil Science is given least priority.
3. Dual responsibility of RSTL.
4. Limited physical facilities
  - a. Lab Building
  - b. Mobility
5. Provision of Lab Allowance

### Recommendations:

1. Organizational Setup and Manpower
2. Single line of Command
3. Physical Facility
  - a) Lab building
  - b) Mobility Facility
4. Provision of lab allowance.



# **Soil Fertility Management Activities, Future Strategy, Constraints and Recommendations**

**S.N. Jaishy  
S.N. Mandel  
R.Manandhar**

## **1. Introduction :**

Agriculture is the mainstay of economy in Nepal providing livelihood for more than 80% of the population. Population growth rate is 2.5% while growth rate on food grain is 2.3% over the period 1980/81 to 1990/91. The additional food production achieved so far is attributed mainly to the expansion in the agricultural land rather than increase in yield/unit of land. More and more of marginal land have been brought under cultivation and there is very little chance to increase cultivable land so the food crisis must be resolved by raising the productivity of existing arable land. Among the different means of increasing productivity, soil fertility management is one of the key factors. Therefore improvement of soil fertility and increased plant nutrient supply through all possible means like organic and inorganic resources and biological sources must be enhanced for increased food production and farmers income (Chaudhary and Manandhar, 1996). Pandey, 1994, also states that Nepal's food security will not be passing without crisis if measures to cope with the declining soil fertility problems are not seriously taken in time.

DOA has the responsibility to transfer the agriculture technology to the farmers, Soil Testing and Service Section (STSS) at the central level and 5 regional labs in the respective region were established in 1992 in order to perform the soil fertility management activities and support agriculture development in the country. Laboratory Soil Testing programs are being launched at central and regional level

and by quick kit box method at field level. Quantity and quality improvement and increment of organic manure as well as inorganic fertilization, soil survey, mapping, land evaluation, land use planning and conservation farming practices program are important for better soil management (Jaishy et.al.1997).

Structure and manpower fulfillment is not scientific at the central and regional level, soil management activities are not up to satisfaction. The soil fertility management programs need to be strengthened to increase the productivity of the country to meet the food need of the increasing population.

## **2. Existing Soil Fertility Management Activities**

Soil Testing and Service section at central level under DOA was established in order to support the agriculture development in the country. STSS is supported by regional soil testing laboratories, they are-

- a. Jhumaka, Sunsary in Eastern region
- b. Trishuli, Nuwakot in central region
- c. Khairnitar, Tanahu in Western region
- d. Khajura, Banke in Mid Western region
- e. Dhangadi, Kailali in Far Western region

## **3. Future Strategy :**

It is meaningless to expect a farmer to be interested in any long term fertility strategy unless it puts food on the table and money in his pocket. Motherhood issues with global consequences will not sell ideas to the farmer. It is important to let the farmer decide what he wants to do for his soil management and let him integrate it within his own system (Carson, 1992). Based on the research works, experience gained in the past and country's need, the following strategy is formulated :

- Formulatin of programs to address soil management tied agriculture productivity and profitability of the farming system.
- Indentification and introduction of soil fertility management programs in the production package that are interesting for the farmer and which have long term beneficial effects.
- Separate soil management strategies for subsistence and commercial agriculture as APP has dictated.
  - (i) 'Demand driven' production system of less accessible hills and mountains is supported by the improvement of their traditional integration system of agriculture, livestock and forest.
  - (ii) "Technology driven" green revolution has been emphasized on the Tarai and in the easily accessible valley of Nepal by supporting mass scale of green manuring and use of bio-fertilizers, where manure and compost is scarce.
- Soil management program needs to focus on the small farmers, which contribute more in Nepalese agriculture. In this connection, special programs need to be run for sustainable soil fertility management based on the study of location specific needs and opportunities. These are to be executed by Regional Soil Laboratories in coordination of DADOs.
- Promote Integrated Plant Nutrient System (IPNS) technologies to the farmers on sound environmental ground and maximum use of local resources on a sustainable basis. This includes the activities on green manuring, compost/ FYM management, use of micronutrients, use of fertilizers and development of alternative sources of fertilizer that include the use of marginal lands and cropped land (as permitted by farming system) in production of fertilizer crops, management of slurry from bio-gas plant, use of microbial fertilizers, etc.

- Carry out necessary surveys for soil inventory creation, fertility evaluation, land use monitoring and feasibility analysis to help program planning, execution, monitoring and identification of location specific soil service needs.
- Besides, structural strengthening of the STSS by provision of necessary manpower at central, regional and district level has been proposed for the Ninth Plan Period.

#### **4. Concept of Soil Services and Action Program :**

A discrete understanding desired from the side of policy level is to differentiate between the soil test services that the STSS is designed for and the land development and soil services that the country needs. Soil Testing is a tool and a partial job of Soil Testing and Service Section and its subordinate regional laboratories. Besides the Soil Testing Services, there are other major programs and activities which are being conducted and some more additional action programs formulated to be executed in the coming days. Under APP, roughly half of incremental output is supposed to come from increasing fertilizer use. In order to make easy availability of fertilizers to farmers, government has brought policy to involve the private sector in the fertilizer business. The quality control of the fertilizers is essential to protect the farmers from economic loss. Thus the following actions are suggested so as to contribute to the national goal of agricultural development.

##### **4.1 Land survey and land evaluation Programs**

- Soil survey and study of local resource bases.
- Land evaluation and land suitability classification from crop production point of view.
- Contribute to the bottom-up approach of agriculture planning by providing land resource information and necessary soil database.

- Creation and preservation of soil and agro-ecological database based on survey, resource monitoring and land evaluation studies.
- Fertility mapping and its use for soil services.

#### **4.2 Soil fertility and Microbiology Programs**

- Technology transfer and demonstrations regarding macro and micronutrient fertilizers, green manure, compost, agriculture lime and new fertilizer materials in IPNS concept.
- Formulation and execution of soil conservation program in farmer's cultivated land
- Development & execution of programs for optimum use of slurry from bio-gas plant
- Initiation of bio-fertilizer program in the feasible pockets
- Monitoring soil fertility situation in the country.

#### **4.3 Soil Test and Recommendation Programs**

- Soil analysis in the laboratories, based on systematic sampling techniques to support soil survey, soil monitoring and mass scale soil services.
- Help soil analytical work in the District Agriculture Development Offices by using soil testing kit.
- Soil analysis for soil problem identification and recommendation for correction
- Promote soil SIBIR (campaign) and MATO SAPTAH in quantitative and qualitative basis to provide field level soil services.

#### **4.4 Fertilizer Monitoring and Quality Control Program**

- Study of Fertilizer standards and formulation of fertilizer act
- Fertilizer monitoring and quality control

#### **4.5 Other Programs**

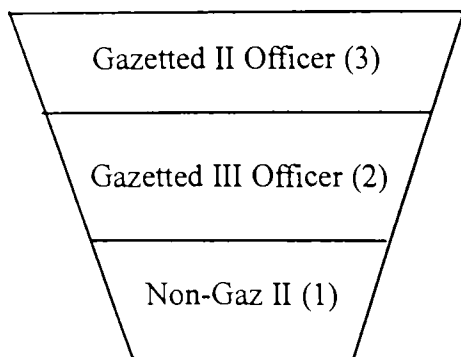
- Conduct various soil based training for manpower development
- Coordinate the soil laboratories for program planning and monitoring.

The above mentioned programs are mandatory as per the national needs and the directives of APP. Expansion of these programs is justifiable so as to increase the area coverage of soil services.

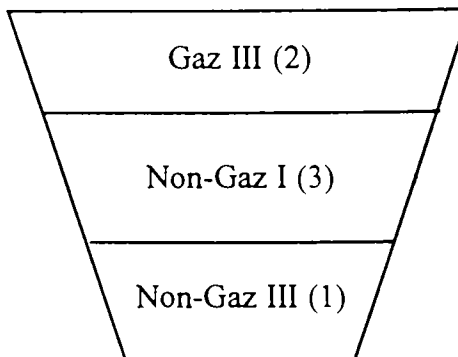
### **5. Constraints :**

#### **1. Defective Organizational Setup and manpower :**

There is the institutional problem that the existing manpower in Soil Testing and Service Section does not permit the support of such a huge load. The technical manpower placement in the STSS is in the form of an inverted pyramid the reverse of the normal situation whereas in RSTL, two assistant soil scientists (Gazetted III), 3 JTs (Non gazetted I) and one lab boy (Non gazetted III) are placed as shown below, there is no administrative and account staff. At the district level there is no directly responsible staff to conduct soil management activities, that is one of the limiting factors in running the soil program effectively in the district.



**At STSS**



**At RSTL**

## **2. Dual Responsibility of RSTL :**

RSTL is under the administrative control of Regional Agricultural Directorate and technically under the STSS. This dual responsibility often causes problems in launching the programs.

## **3. Limited physical facilities**

### **a. Lab Building**

- i) Mid western (Banke) and Far western (Kailali) regional labs do not have their own lab building.
- ii) Eastern regional lab has acquired two old family quarters from the Eastern Agriculture Training Center, Jhumka, which need repair.
- iii) STSS has acquired one Auditorium hall of DOA, which is planned to be repaired and furnished in this fiscal year.

b. Mobility

Neither the STSS nor the Regional lab has any vehicle facilities to support the programs, this reduces the quality and quantity of programs in districts and at the field level.

**4. Provision of Lab Allowance:**

There is no separate allowance for working in the lab. Working in lab is risky and hazardous to the health.

**6. Recommendations:**

1) Organizational Setup and Manpower

According to Pandey, 1994, the DOA is well composed, strengthened down to the village level, Soil Testing Service Unit under DOA has to be strengthened and made responsible to promote IPNS technologies to the farmers. However, full capacity of this unit is yet to develop.

Dr. Hari Dahal, realizing the importance of nutrient management, did his Ph.D. dissertation on Ecological Approach to sustainable Agriculture through Integrated Nutrient Resource Management: A micro level study in the eastern Tarai Farming System, Nepal. On the basis of analysis of the quality and quantity of on-going soil programs, he recommended the need of upgrading the Soil Testing and Service Section to National Center for Soil Fertility Management, which should constitute four divisions as follows:

1. Soil Testing, Survey and Nutrient Mapping Division.
2. Nutrient Field Demonstration Division.
3. Soil Fertility Planning and Evaluation Division.
4. Farm Soil Conservation and Rural Energy Division.



He has given details on organizational set up and detail working mandates under each division (Fig.1). He put forth the view that this institutional framework would be a milestone in initiating an integrated approach of crop nutrition that takes into account a holistic view of soil resource management for achieving sustainability in major cropping systems in Nepal.

On the basis of analysis and discussion done by the experts working in soil fertility, it is strongly felt that the need of correction of present unbalanced manpower structure and the section need to be upgraded into *Land and Soil Service Division* with provision of optimum number of manpower. Below is the detail of the manpower condition that exists and is, in fact, essential to run the proposed soil services effectively.

### **Existing and Proposed Manpower**

	<b><u>Existing</u></b>	<b><u>Proposed</u></b>
<b>Soil Test and Service Section</b>		
<b><u>Technical</u></b>		
Chief Soil Scientist (Gazetted I)	-	1
Soil Scientist (Gazetted II)	3	4
Asst. Soil Scientist (Gazetted III)	2	4
J.T. (Non-Gazetted I)	-	4
J.T.A (Non-Gazetted II)	1	6
Lab Boy (Non-Gazetted III)	-	6
Peon	-	3
<b><u>Administrative</u></b>		
Sub-Accountant (Non-Gazetted II)	1	1
Administrative Assistant/Store Keeper (Non-Gazetted II)	1	1
Typist	1	-
Computer Operator	-	1

Driver	-	1
Peon	1	3
Sweeper	-	1
Total	10	36

### **Regional Soil Laboratories (For each lab)**

#### **Technical**

Soil Scientist (Gazetted II)	-	1
Asst. Soil Scientist (Gazetted III)	2	2
J.T (Non-Gazetted I)	3	3
J.T.A (Non-Gazetted II)	-	3
Lab Boy (Non-Gazetted III)	1	3
Peon	-	2

#### **Administrative**

Sub-Accountant (Non-Gazetted II)	1	1
Store Keeper/Admn. Assistant (Non-Gazetted II)	-	1
Typist	-	1
Driver	-	1
Peon	-	1
Watchman	-	1
Total	7	20

### **District Agriculture Development Offices**

#### **Technical**

Assistant Soil Scientist (As Service Center Chief)	3	-
Assistant Soil Scientist (As SMS)	-	25*

### **Regional Agriculture Training Center (For 5 RATC)**

#### **Technical**

Assistant Soil Scientist (As SMS)	1	5
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(\*During ninth plan period, 25 Asst. Soil Scientists are to be recruited in the potential districts from soil service program point of view)

## 2) Single line of Command :

Regional Soil Testing Laboratories, technically and administratively should be under one line of command.

## 3) Physical Facility

### a) Lab building

Soil lab must have its own building, it needs specific design for installation of equipment. It is risky and inconvenient to establish soil lab in rented house.

### b) Mobility Facility

Mobility facilities are essential to improve the quality of an on going program and to increase the service area coverage. So each soil lab should have at least one vehicle to launch the program effectively.

## 4) Provision of lab allowance :

There should be provision of lab allowance to encourage the lab technicians to work effectively.

## 7. **Conclusion:**

Soil Fertility decline is one of the major problem in agricultural production system in Nepal which need to be improved in order to increase productivity of land resources by using the action program stated above. For the launching of the program effectively, STSS, as well as RSTL need to be strengthened and placement of manpower responsible to conduct soil programs in the district is also essential.

# National Centre for Soil Fertility Management

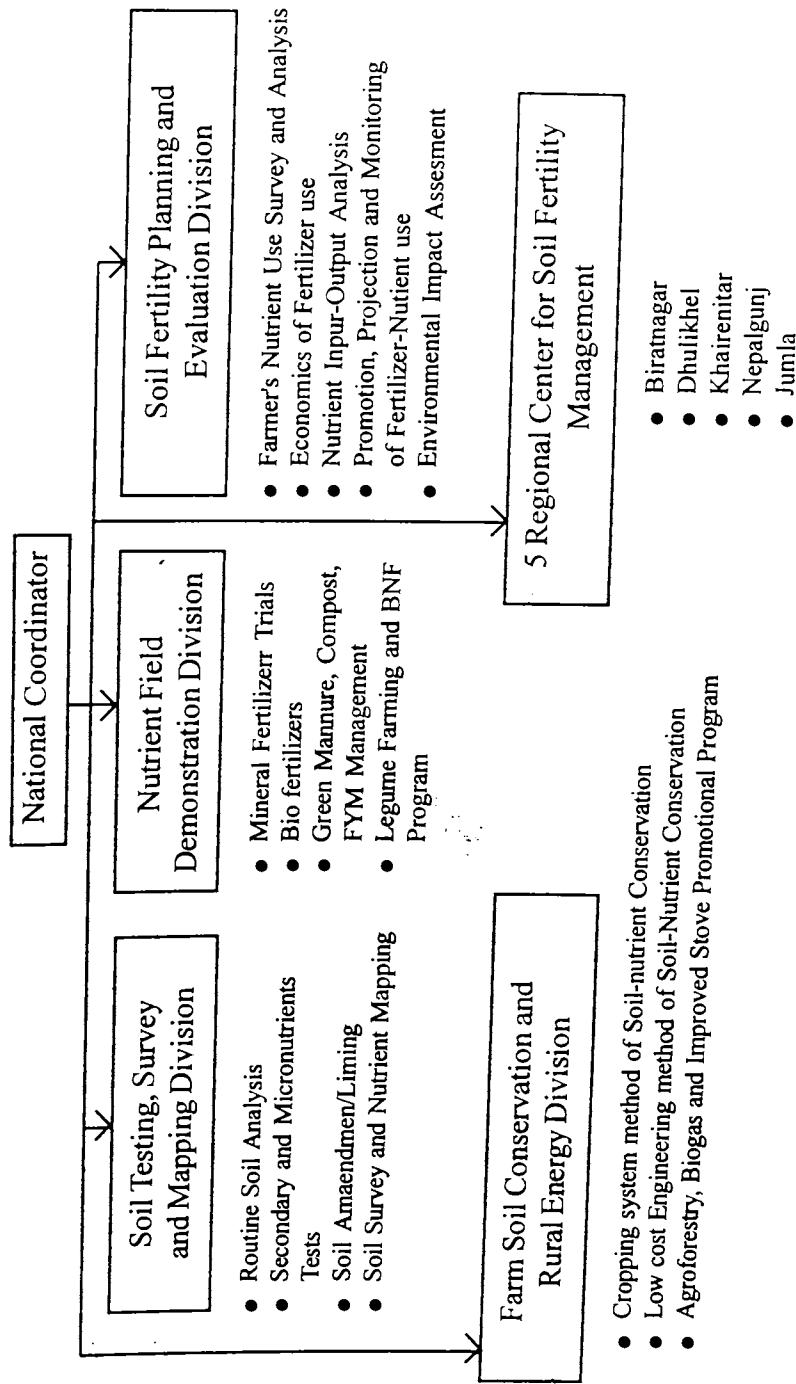


Fig. 1 : Organizational Setup of National Center for Soil Fertility Management

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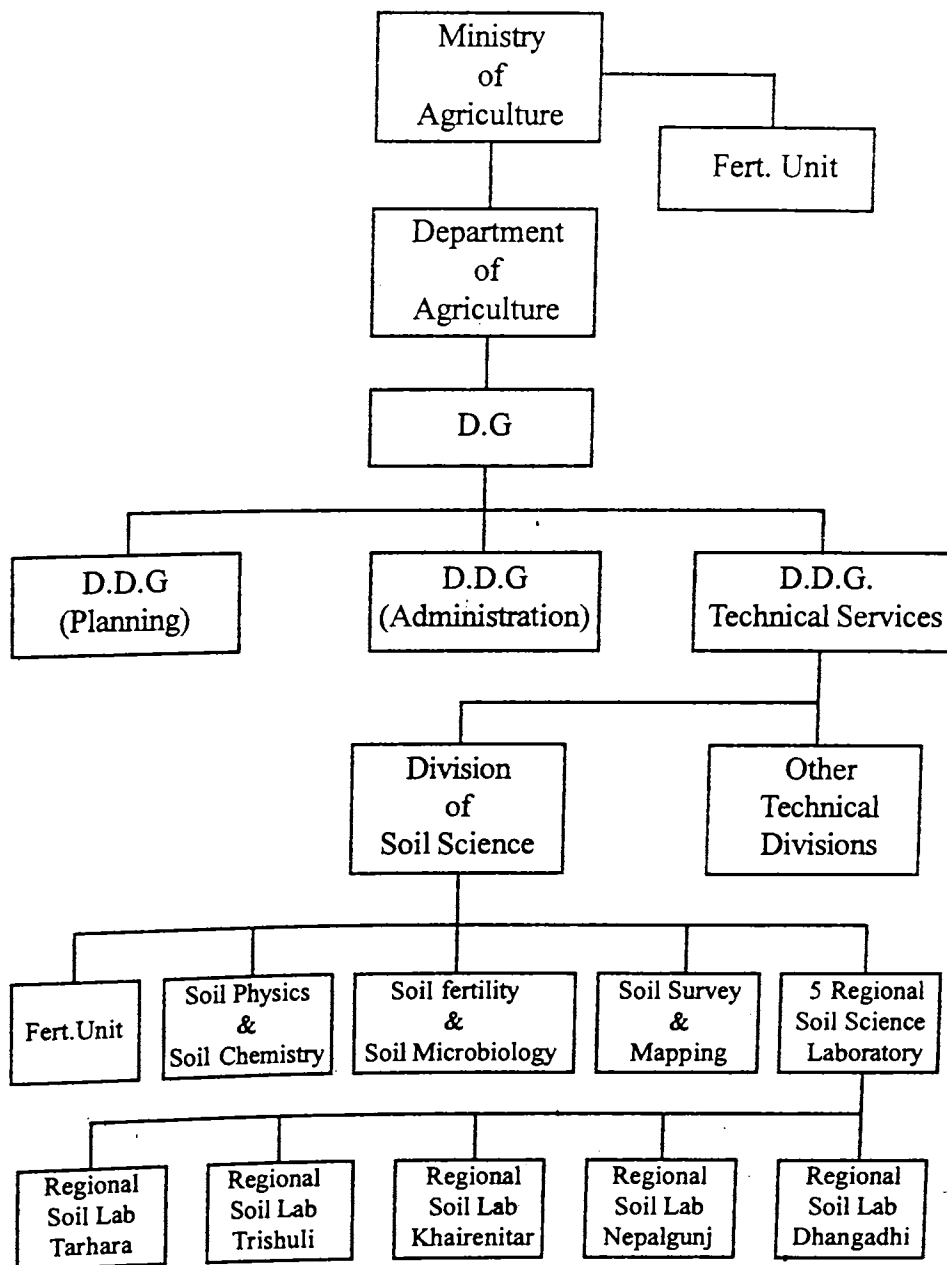
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## Proposed Organisational Chart



# **Appropriate Soil fertility Management action program in District level, it's implementation scope and constraints**

**Mr. B. M. Adhikari**

*Assistant Soil Scientist*

Regional Soil Test Laboratory, Khaiarenitar.

## **Introduction :**

Soil test services program was established in BS 2049 under the Agricultural Extension Division of DOA and concept of five regional laboratories (RSTL) were developed. In this way RSTL were established in 2051. Soil Testing and Service Section was brought under Crop Development Division in 2052. Regional Soil Testing Laboratories are administratively under the Regional Agricultural Directorate and technically under the Crop Development Division/STSS.

## **Existing Program and achievements**

### **a. Service oriented**

1. Soil Sample collection, analysis and recommendation.
2. Soil test campaign.

### **b. Technology transfer**

1. Training to JT/JTA and leader farmers.
2. Demonstration
  - 2.1 Micronutrients (Boron and Zinc)
  - 2.2 Agricultural lime

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Mr. M.N. Kuwar, Mr. B.M. Adhikari, Mr. T.B. Karki, Mr. J.N. Adhikari, Mr. N.L. Urau, Mr. R.D. Yadav, Regional Soil Testing Laboratories  
Mr. R.M. Yadav, Mr. P.P. Adhikari, District Agriculture Development Office, Rautahat, Mrs. N. Dahal, Cotton Development Section, Mr. J. Khadka, Fruit Development Division, Assistant Soil Scientists.

- 2.3 Green manuring
- 2.4 Composting
- 2.5 Bio-fertilizer

- c. Soil survey and fertility mapping
- d. Monitoring and evaluation of soil related programs (such as demonstrations on micronutrients, agricultural lime, composting etc.) of command districts.
- e. Study on micronutrient deficiency.
- f. Suggestion to the problematic area

### **Achievements**

All RSTLs are able to perform routine analysis (pH, organic matter, nitrogen, phosphorus, potash and texture).

Farmers are aware of importance of soil and necessity of its fertility management.

Mapping of following districts were completed.

- A. Lime requirement of Jhapa, Bhaktapur and Tanahu.
- B. Fertility mapping of Kanchanpur.

### **Appropriate Soil Fertility Management through following programs**

#### **pH correction**

- Soil test campaign
- Agricultural lime demonstration

#### **Building up of organic matter**

- Balance use of chemical as well as organic resources.
- Emphasis on proper use of Bio-gas slurry as fertilizer material.



- Discouraging dung cake burning in Terai area by creating awareness on the importance of cow dung as organic source in their field for sustainable soil fertility management.
- Introduction of leguminous crops in cropping pattern.
- Priority on soil conservation.
- Coordination with NARC.

#### Constraint

- Lab Standardization and quality services.
- Micronutrients, plant sample and chemical fertilizer analysis.
- Responsible person to conduct Soil & Soil management program in district level.
- Staffing.
- Skill Development.
- Mobility.
- Incentives.
- Organization.
- Dual direction.

#### Proposed Suggestions

- Infrastructure development, equipment support and Human resource management of manpower development.
- A soil wing in agriculturally potential district is an essential.
- One way of administrative control and linkage of RSTL to the respective division/section should be made effective.
- Provide vehicles for effective program implementation.
- Laboratory work is risky and health hazardous, therefore some allowance must be provided.

### Proposed Staffing at RSTL :

S. N.	Position	Existing No.	To be created	Total
	Technicians :			
1.	Soil Scientist G II	-	1	1
2.	Assistant Soil Scientist G III	2	-	2
3.	Junior Technician NG I	3	-	3
4.	Junior Technical Assistant NG II	-	1	1
5.	Field Assistant NG III	1	-	1
6.	Kharidar NG II (Account)	-	1	1
7.	Kharidar NG II (Administration)	-	1	1
8.	Typist	-	1	1
9.	Driver	-	1	1
10.	Peon/Watchman	1	2	3

### Comparison with other Regional Labs.

Regional Labs	District Unit	Technical						Acc	Adm.	Peon	Total
		Gazetted		Non Gazetted				NG	NG		
		II	III	I	II	III	IV	II	II		
Soil Test	Some	-	2	3	-	1	-	-	-	1	7
Seed Processing	Some	-	2	1	1	1	-	1	-	1	7
Plant Protection	All Districts	1	1	2	-	1	1	1	1	2	10

### Suggestions :

S. N.	Existing		Existing		Proposed			
	Group	%	Divisions	%	Either		Or	
					Divisions	%	Divisions	%
1.	Agronomy	14.28	Crop Development	10	1	9.09	1	14.28
2.	Soil Science	14.28	-	0	1	9.09	1	14.28
3.	Horticulture	14.28	Fruit Development Vegetable Development	20	2	18.18	1	14.28
4.	Fishery	14.28	Fishery Development	10	1	9.09	1	14.28
5.	Plant Protection	14.28	Industrial Entomology Plant Protection	10	2	18.18	1	14.28
6.	Agriculture Extension	14.28	Agriculture Communication Agriculture Extension	20	2	18.18	1	14.28
7.	Agriculture Economics	14.28	Economic Development Market Development	20	2	18.18	1	14.28
	Total	99.96		100	11	99.99	7	99.96

# **Suggestion and comments on ongoing soil fertility program and role of JICA expert in strengthening the program**

**T. Fujimoto (JICA Expert)**

The JICA individual expert was dispatched in July 1996 to cooperate with the soil fertility management program of Soil Testing & Service Section (STSS), Department of Agriculture. In this paper, we deal with the problems and countermeasure for more efficient implementation of the soil fertility management program. Through the visit to five Regional Soil Testing Laboratories (RSTL) with the staff of STSS, we observed the activities and understood where the problems lie. We also observed demonstration farms managed by RSTL and Agriculture Service Center.

There are many problems. Above all, the lack of building, facilities and manpower are very serious. Jumuka, Khajura and Dhangadi RSTL do not have their own buildings. They borrow a part of the building for laboratory from DADO, NARC and private sector respectively. Furthermore, the space for office and laboratory is not sufficient for daily routine.

Suggestion and comments for more efficient implementation of the soil fertility program from the standpoint of technical aspects are summarized as follows.

- (1) The soil testing aims for the increase of soil productivity by proper soil management especially improved fertilization. The primary duty of STSS is to examine the soil fertility status of farmer's field and give recommendation to farmer on soil management.

The number of soil samples analyzed a year by each RSTL ranged between 100 and 400 in 1995/96, about 1400 in the whole country. This is very small number as compared with that of farmers. It is recommended to increase the number of soil samples so as to prevail in every village at least one sample every year.

- (2) The current soil testing deals with pH, organic matter, phosphorus and potassium concentration of the plow layer soil. It is necessary to revise the soil testing ratings. It is important to take soil type and other factors into consideration.
- (3) Each RSTL has accumulated a large number of soil testing data so far. It is recommended to compile data to clarify the current conditions of soil fertility status by district or village level. For efficient compilation, it is necessary to introduce personal computer to each RSTL. For the time being, the Central office should collect all the data for further compilation and trend analysis. The JICA expert compiled part of them and summarized using personal computer.
- (4) Soil test kit is used for pH, N, P and K analysis in soil testing campaign. The results obtained by test kit is unreliable as most staff of STSS recognized well. It is recommended not to apply this method. They often use very old inferior reagent. As mentioned elsewhere, comparison of the analytical results between kit method and laboratory analysis is recommended before the use of this method.
- (5) The chemical analysis must be accurate. It is necessary to check the accuracy of analysis and know its confidence limit because it is inevitable that the error arises from the analytical procedure. We recommend the followings to check the accuracy and confidence limit of analysis.

One is to conduct the cross check among five RSTLs using the same soil sample prepared by central laboratory.

The other is the use of standard soil sample. To check the confidence limit of the chemical analysis, several kinds of standard soil samples should

be prepared and distributed to all RSTLs. It is recommended to analyse standard samples occasionally to check the accuracy of chemical analysis.

- (6) The effects of new fertilizers, micro-nutrient fertilizers and green manure application are demonstrated on farmers' field. It is essential to know the chemical properties of the farm in selecting the test site. As for the demonstration of micro-nutrient fertilizer, the micro-nutrient concentration of the demonstration field must be clear. However, it seems that it is not certain whether the soil is deficient in the micro-nutrient or not.

As there is no signboard in the demonstration farm, it is doubtful if farmer understand the meaning of demonstration. It is recommended to install the signboard with the explanation of demonstration.

### **Role of JICA expert**

The primary role of JICA expert is to assist the smooth implementation of soil fertility program. The JICA expert was requested to submit recommendation for more efficient progress, to donate equipment and transfer technology on soil chemical analysis.

As we realized the importance of soil fertility program, submitted project proposal on Project-type technical cooperation, "Soil Fertility Improvement Project". This proposal includes dispatch of experts, counterpart training and donation of equipment.

The equipment necessary for soil chemical analysis is not sufficient for daily routine. We requested to JICA the donation of equipment. Although JICA approved of provision but their arrival to this country is delayed. On arrival of equipment, the JICA expert can start the technology transfer on soil analysis.

# Summary of Dissscussion

## First session discussion

First session discussion on the present situation of the Central as well as regional laboratories. All the soil scientists participated on this session. The soil scientists from each lab present their present condition of analysis, instruments, their problem regarding to technical situation of the labs. In all the labs there are problem of minimum staff and lack of accountant and storekeeper or unscientific manpower structure.

### In Tarahara lab

- Doing all analysis except nitrogen due to lack of space for digestion.
- Discussion on recommendation of fertilizers.

### Nuwakot

- In analysis part P and K is not doing
- One week training needed for analysis in central lab
- Lack of manpower.
- No digestion chamber and complete set.

### Khairanitar

- Analysis are going on nicely.
- But equipment are old need to replace because all instruments were given by GTZ in 1976/77.
- Flame photometer and electrical balance are out of order.
- The JT/JTA should be intermediate in science. The only it will be easy to work.

### Dhanghadi

- Analysis part is going on smoothly except nitrogen analysis.

### Horticultural Project soil lab (Kritipur)

- The work in this lab is related to the horticultural section. Mainly doing routine analysis and supported by JICA.

The discussion was carried out in the presence of Chairperson Mr. G.P. Pandey (Chief Crop Development Division). Mr. Pandey highlighted on the importance of the section and regional labs and need of further improvements in future. He suggested the forum to work sincerely and there is present need to analysis of the fertilizers. He will help for further improvement of the central as well as regional labs. As for the need of manpower also if section will do something division will fully support it because it is one of the big problem in this field.

### **Second session**

In this session chair person was Tek Bahadur Thapa (DDG, planning, DOA) and session was chaired by Tek Bahadur Shrestha (DG of DOA). Two papers were presented.

Soil Fertility Management Activities, Future Strategy, Constraints and Recommendations by S.N.Mandal

Appropriate Soil Fertility Management action program in District level, its implementation scope and constraint by B.M.Adhikari.

In first paper focus on organizational set-up, Mr. Mandal has presented organizational set-up proposed by Dr-Hari Dahal, Dr. Dahal proposed the organization as National Center For Soil Fertility Management. Mr.T.B. Thapa put comment about this structural institutional set-up whether Mr. Mandal wanted same structure as proposed by Dr. Dahal or modified one, which was not clear from his paper. It must be clarify. Mr. Mandal said that we want similar type of structure which strong enough to work according to national policy.

In same discussion Mr. B.M. Adhikari mentioned that we need upto date structure of our institution as need of today.

Mr. T.B.Shrestha said that we need the structure as require by APP. What is the spirit of the people.

### **Summary of the presentation**

Mr.T.B Thapa gave valuable suggestion to prepare brief summary of presentation.

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