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Executive Summary

Adoption of Recommended Doses of Fertilisers on Soil Test Basis by Farmers for Paddy and Groundnut in Tamil Nadu

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1. Introduction

Fertilizers are one of the major inputs of agriculture. They are used to increase crop production. We are in the second place in fertilizer consumption, next to China. In India, fertilizer consumption had increased over a period of four decades. We are one of the large producers and consumers of fertilizers in the world. There is an increase in production because of efficient technologies used in the agricultural sector leading to economic and social development. The fertilizers play crucial role in the agricultural sector. During 2010, Egypt (368.7 kg/ha.), Korea (269.7 kg/ha.), Malaysia (265.4 kg/ha.), Vietnam (223.9 kg/ha.), Japan (212.5 kg/ha.) and India (156.3 kg/ha.) were the leading consumers in agriculture in the world. Among them, Egypt topped the list. On the other hand, India is consuming the lowest level of fertilizers compared to other large consumers in the world.

In India, there is an increase in demand for food and this in turn increases the demand for fertilizers. The increase in food production is due to use of proper inputs like fertilizers, quality seeds and pesticides. The fertilizer consumption in India increased from 65.6 thousand tonnes in 1950-51 to 25.54 million tonnes in 2012-13. The consumption of fertilizers has increased from 2.18 MT in 1970-71 to 12.54 MT in 1990-91. After the economic reform period, it increased to 28.12 MT in 2010-11; but it declined to 25.53 MT in 2012-13. It implies that the rapid expansion of irrigation, introduction of HYV seeds, introduction of Retention Price Scheme, distribution of fertilizers to farmers at an affordable price, expansion of dealers network, improvement in fertilizer availability and virtually no change in farm gate fertilizer prices were the major

reasons for the increase in fertilizer consumption (Department of Agriculture and Cooperation, Government of India, 2013).

The average fertilizer consumption (per hectare) was very meagre amounting to 2 kg in 1950; it increased to 5 kg in 1965-66. After the Green Revolution, the consumption pattern increased from 7 kg in 1980-81 to 128 kg in 2012-13. Fertilizer consumption increased to 121 kg/ha. due to the development of technology in agriculture. But in the meantime, the consumption fell down to 1973-74 because of oil crisis in the international market. After the economic reform period, the second oil crisis affected the fertilizer industry. The Government of India decontrolled phosphates and potassic fertilizers and increased fertilizer prices significantly.

2 Background of the Study

India's agricultural sector has undergone considerable change since the introduction of high yielding varieties in the mid-1960s. The Green Revolution technology has increased crop output and farmers' income. With the improvement in production, India's position has turned from the state of net importer of agricultural products to exporter of certain commodities like rice, wheat and sugar. At farm household level, the green revolution technology helped to improve the livelihood pattern, nutrition and education of children. However, the technology has brought some negative aspects as well. Since it proved successful in irrigated areas, the dry land regions and the crops grown therein were left out of the process and hence had created regional disparity in rural incomes (Krishnaji 1975; Rao 1996; Vaidyanathan, 1988). Further, the

technology has also altered the traditionally followed cropping pattern, which comprised growing multiple crops every season, to mono-cropping for example, cultivation of only rice in some parts of south India. This practice put the land and other resources under severe strain resulting in depletion of soil nutrients, decline in water table, build up of pest and diseases, and micro-nutrient deficiency (Murgai et al. 2001; Pingali and Shah 2001).

Chemical fertilizers are the important source of nutrients for plant growth. With the advent of fertiliser responsive crop varieties, total consumption of nitrogenous (N), phosphatic (P) potassic (K) fertilizers increased from about 1.1 million tonnes in 1966-67 to 27.8 million tonnes in 2011-12. The all-India average consumption of fertilizers increased from 6.9 kg per ha of gross cropped area to 139.7 kg per ha during the same period (Fertiliser Statistics 2013). However, the level of consumption of fertilizers highly varied within as well as between states. The consumption varied from 243 Kg/ha in Punjab to 54 Kg/ha in Himachal Pradesh during 2011-12. The variability in consumption of fertilizers can be attributed to different cultivation methods, type of crops and subsidy on fertilizers. Further, the consumption of fertilizers also varied across farm size groups with the highest amount of consumption recorded among small farmers.

There are concerns about the indiscriminate use of chemical fertilizers by farmers with a view to increase the crop yield. This has led to deterioration of soil structure, wastage of nutrients, and destruction micro-organisms in the soil and scorching of plants at the extreme cases. A combination of factors such

as intensive cultivation of crops, differential pricing of fertilizers and subsidy, might have contributed to excessive use of fertilizers by the farmers. At the same time, it is reported that many parts of India have shown deficiency of not only primary nutrients (N, P, K) but also secondary nutrients (Sulphur, Calcium and Magnesium) and micro nutrients (Boron, Zinc, Copper and Iron). The Government of India had undertaken initiatives to ameliorate the situation and encouraged the farmers for balanced use of fertilizers. These initiatives among others, included decontrol of phosphatic and potassic fertilizers, promotion of integrated nutrient management, production and promotion of organic manures and bio-fertilizers, National Project on Management of Soil Health and Fertility (NPMSF), and nutrient based subsidy (NBS) policy. Attempts were also made to strengthen and revamp soil testing laboratories in various districts under NPMSF. Farmers were encouraged to test their soil periodically and apply fertilizers based on the deficiency of nutrients in soil. This was intended to ensure a balanced supply of nutrients for maintaining soil health and improving crop productivity.

3. Need for the Study

In the light of increased degradation of natural resources due to intensive cultivation and injudicious use, their sustainable management holds the key for ensuring sustainable food production. Due to lack of awareness among the farmers, there are widespread problems related to the indiscriminate use of chemical fertilizers, mismanagement of surface water and over-exploitation of ground water. The over-use of chemical fertilizers in most

parts of India for nutrient management in farming in the last few decades has led to several problems affecting soil health, nutrient flow and natural environment. There is a need for promoting, among others, balanced use of fertilizers for increasing productivity of crops and for better absorption of nutrients from the applied fertilizers.

It is suggested that farmers should go for regular soil testing and use recommended doses of fertilizers as advised by the agricultural scientists. In this connection, the Task Force on Balanced Use of Fertilizers recommended formulating a centrally sponsored scheme entitled, "National Project on Management of Soil Health and Fertility (NPMSF)". Accordingly, this scheme has been implemented since 2008-09 and it encompasses three components viz., strengthening of soil testing laboratories (STLs), and promoting use of integrated nutrient management and strengthening of fertiliser quality control laboratories. There is no systematic study undertaken so far for evaluating the effectiveness of the programme on crop productivity, extent of soil testing for nutrient deficiency and adoption of recommended doses of fertilizers by farmers based on the soil tests. Therefore, the present study examines the level of adoption and constraints in the application of recommended doses of fertilizers, impact on crop productivity and relevant institutional problems.

4. Objectives of the Study

The objectives of the study are as follows:

- To examine the level of adoption and constraints in the application of recommended doses of fertilizers based on soil test reports by the farmers.

- To analyse the impact of adoption of recommended doses of fertilizers on crop productivity and income of farmers

6. Data and Methodology

The data for the study were collected from primary and secondary sources in Tamil Nadu. The secondary data relating to area, production and productivity of rice and ground nuts and fertiliser consumption were obtained from Government of Tamil Nadu publications. Primary data were collected from two districts namely Thiruvannamalai and Thanjavur of Tamil Nadu. In each of the districts of Thiruvannamalai and Thanjavur, two representative blocks namely, Cheyyar, Kalasapakkam, Thanjavur and Orrathanadu are taken respectively and within each block two villages are selected (Table:1).

In each district, 120 farmers from the list of soil tested farmers in that district were drawn at random from households with different land sizes on the basis of their proportion in the universe. In addition to the above sample, 60 control (non-soil tested) farmers were selected in each district randomly from households with different land sizes amongst general rice and groundnut growing cultivators following the same method. Thus, altogether, 120 soil tested farmers were selected from each district (Thiruvannamalai and Thanjavur). In

all, 240 soil tested farmers among two districts form the selected sample size in the study.

For the primary survey, the reference year is 2013-14. Accordingly, *kharif*, *rabi* and summer seasons for the rice and groundnut crops were covered. The random sample methods adopted at the district, block and village level for the primary survey are given in Table 1.

Table: 1 Sample Distribution of Thiruvannamalai and Thanjavur Districts of Tamil Nadu

Block Level	Soil Tested Farmers	Control Farmers	Total Farmers
Thiruvannamalai District			
Cheyyar	60	30	90
Kalasapakkam	60	30	90
Thanjavur District			
Thanjavur	60	30	90
Orathanadu	60	30	90
Total Sample Size	240	120	360

Source: Field Survey

The reference period of the study was 2013-14. The list of farmers who got their soil tested were collected from the State Department of Agriculture for the year 2012-13 to assess the adoption of recommended doses of fertilizers. Two major crops namely paddy and groundnut were selected from each district. From each district, two taluks were selected again based on the crop area share.

The survey also involved 30 control (non-soil test) farmers, for each reference crop from each district, selected purposively from the chosen cluster for differentiating the effect of the application of the recommended dose of

fertilizers on crop productivity and income. Thus, a total of 120 soil test farmers and 60 control farmers for each crop were interviewed.

7. Organisation of the Research Study

The present study is divided into seven chapters. The first chapter is introductory in nature; it contains the background, objectives, data base and methodology of the study. The second chapter describes the growth trends of fertiliser consumption in Tamil Nadu. The third chapter analyses the socio-economic profile of the soil tested and control farmers of paddy and groundnut in Thiruvannamalai and Thanjavur districts of Tamil Nadu. The fourth chapter examines the issues relating to soil testing and adoption or otherwise of the recommended doses of fertilizers in the study area in Tamil Nadu. The fifth chapter deals with the adoption of recommended doses of fertilizers and its constraints. The sixth chapter deals with the impact of the adoption of recommended doses of fertilizers on the productivity of crops of the soil tested farmers in the study area. The last chapter provides the concluding remarks and policy suggestions on the basis of the study.

8. Summary of Findings

The socio-economic conditions of the sample households provide a background for our study. Among the soil tested farmers, the small and the marginal farmers cultivate three-fourths of landholdings and only a small proportion of the land is cultivated by the large farmers. A majority of the farmers belonged to OBC category and meagre percent of the farmers belonged to SC category. The marginal and the small farmers have fourth-fifths of share of the landholdings and the large farmers constitute a small proportion.

Among the soil tested farmers, the average owned landholding per household is 6.1 acres and total leased-in- land is 1.3 acres. The large farmers have the highest average landholding of 12.9 acres followed by the medium farmers with 6.4 acres of own land in the average. The average net operated area is 7.4 acres. The large farmers are having the highest average area of 16.4 acres followed by the mediums farmers who have an average net operated area of 7.5 acres. But the average size of the net operated area by the marginal farmer is 1.69 acres.

The average own landholdings is 6.5 acres for the non-soil tested farmers. The large farmers have 15.3 acres and the marginal farmers have 1.6 acres. It implies that the majority of them have large own land and smaller proportion of leased-in-landholdings. The average net operated area is 7.1 acres, but the figure for households with large farmers is 15.6 acres.

The average size of the owned land holdings of the non-soil tested farmers is more than that of the soil tested farmers. But the average net operated area is more for the soil tested farmers than the control farmers due to more of leased-in-landholdings among the soil tested farmers.

Bore wells are a main source of irrigation for the soil tested farmers. They are drilled upto 700-1000 feet in the land for getting water in Thiruvannamalai district. But for Thanjavur district, they are using river based irrigation system; during the dry seasons, the bore wells are very useful and they are nearer to river beds. Sometimes, farmers incur losses when water is not found when bore wells are dug. The bore wells account for two-thirds of the total irrigation among the small, the medium and the large farmers. Canal irrigation accounts for one-third of the total irrigation among the medium and the large farmers. The marginal

farmers mainly depend upon bore wells, river and open wells as major source of irrigation.

Bore wells are the major source of irrigation for non-soil tested farmers. Quite a sizeable number of them mainly depend upon the bore wells alone. The main reason is that the large farmers are financially capable of digging the bore wells but, the marginal farmers have to borrow for digging them. The bore wells account for two-thirds of the total irrigation among the large, the medium and the small farmers. Canal irrigation forms one-third of the total irrigation.

Paddy and groundnut is predominantly cultivated by the soil tested farmers. A majority of them cultivate paddy as major crop during kharif and rabi seasons. The cultivation of paddy is minimal during summer season. Alternately, the farmers cultivate pulses, gingili and cotton during summer season.

In Thanjavur district, a majority of the farmers cultivate paddy on a regular basis and in the Orathnadu, the farmers cultivate groundnut in a larger area. The main reason for the cultivation of groundnuts is the relative scarcity of water. Therefore, they have cultivated groundnut, cotton and pulses as a alternate crops. But in Thiruvannamalai district, a majority of the farmers have adopted groundnut as a major crop and sugarcane, cotton and paddy are also cultivated. Due to non-availability of water in palar river and sathanur dam, a large number of farmers mainly depend upon the bore wells.

A majority of the non-soil tested farmers cultivate paddy as the principal crop in the kharif as well as rabi season. They cultivate groundnuts and sugarcane only on a small scale. About 60 percent of the Gross Cropped Area is covered under the paddy crop among different categories of farmers during kharif and rabi seasons put together. During summer season, they cultivate pulses, cotton, sugarcane, and groundnut as alternate crops.

The percentage share of HYV seeds used in paddy cultivation in GCA is higher for control farmers than that of the soil tested farmers. But for groundnut crop, the percentage share of HYV seeds in GCA among the soil tested farmers is higher compared to non-soil tested farmers. The total area under HYV seeds of paddy and groundnuts among non-soil tested farmers is more when compared with the soil tested farmers.

The average household asset value of the non-soil tested farmers is more than that of the soil tested farmers. The tractor value for non-soil tested household is comparatively higher than the soil tested farmers. The motor value of non-soil tested farmers is higher than that of the soil tested farmers and the reason for that is they buy relatively new motors. But soil tested farmers buy pump sets which are nearly 10-15 year old. The estimated value has declined.

For the soil tested farmers, land development banks provide a large proportion of credit. The large and the small farmers receive a lot of credit facilities. The marginal and medium farmers availed of low credit facilities. The commercial banks are leading banks providing agricultural credit facilities on a regular basis. The large farmers receive larger amount of credit facilities from banks, whereas the small and marginal farmers received smaller amount of credit.

The large and the marginal farmers received the lowest amount of credit from the cooperative societies. The farmers have access to cooperative societies because they are located within the rural area. Thus the cooperative banks, commercial banks and land development banks provide credit facilities to the soil tested farmers as crop loans and for land development purposes.

Among the non-soil tested farmers, commercial banks provide the largest amount of agricultural credit to the farmers. The small and large farmers receive

from the cooperative societies average credit of Rs. 23,362 and Rs.21, 556 per household, respectively. It is found that the cooperative societies and commercial banks provide credit facilities to the farmers in an easy manner. The procedure followed by these banks for giving crops loans facilities availing of loans without much difficulty by the farmers.

Among the soil tested farmers, one-fourth of them reported that they availed the loan for seasonal crop cultivation purposes. One-tenth of them reported that they availed the loan for land development and consumption purposes. Very meagre percentage of farmers used their loan for land development purposes. Nearly, half of the soil tested farmers did not avail of the agricultural credit facilities. The remaining 50 percent of the farmers used their loan for seasonal crop development purposes.

It is found that the large and medium farmers cover larger area for soil test purposes. But the marginal farmers cover only a small piece of land. All farmers have to travel long distance for soil test incurring sizable transportation cost. Generally, in Thanjavur district, soil test farmers have been travelling long distance from their farm to Aduthurai, where the soil test laboratory is located, at a distance of 50-60 km. There is no soil test laboratory in Thanjavur district. Hence, the farmers have to travel to the neighbouring district of Trichirapalli.

The large farmers have to bear high soil test cost than others. All farmers had to travel long distance to test the soil. In Thiruvannamalai district, the soil testing laboratory is located in headquarters. The soil tested farmers travel from Vembakkam and Mamandur to Thiruvannamalai where the laboratory is located and the average distance is about 80-100 km.

The Agricultural department, Government of Tamil Nadu collect the soil from the farmers for soil testing purposes. Cent percent of soil test is done by the Department for the farmer's welfare. The soil testing process is not an easy task; only a few soil samples are analysed by the experts. Therefore, only limited facilities are available in the laboratory.

Agricultural Department, Government of Tamil Nadu have given valuable information about the soil test uses and how to collect the sample soil from the field. But, still a large of number of farmers could not be informed about the purpose of soil tests. Some of them in the village are not interested to get information about soil tests. Only educated, interested and knowledge farmers are using this kind of information. But, a large number of the sample farmers are not interested to get information about the soil testing process.

Nearly half of the paddy cultivators expressed the view that the soil test has an important role in increasing crop yield. Nearly, two-thirds of the groundnut cultivators said that soil test was important for increasing crop yield.

Almost a half of the paddy cultivators informed that they did not how to take soil samples from their farm land, whereas, another half of them reported that they did not know whom to approach in this regard. One-third of the groundnut cultivators did not know how to take soil samples and more than one-third of them did not know whom to contact for details on testing.

In rural areas, the farmers did not know much about the soil test. For instance, they do not know about location of the laboratory, officials involved with it and how to take soil samples from the farm land. The soil testing laboratories are located far away from their farms. These are the major reasons cited for non-participation in the soil test process. No one seems to be guiding the farmers for conducting the soil test in the village in a proper manner.

The negative attitude of the farmer's mindset in the rural areas could be another reason. The adverse weather conditions restricted them to follow traditional farming methods instead of experimenting with new methods of cultivation. Unawareness was also a reason for non-adoption of recommended doses of fertilizer on the basis of soil tests.

Among the paddy cultivators, nearly half of them said that the nitrogen content in the soil was at a low level and only meagre percentage was at normal level. High content of phosphorus and potassium is recorded in the soil health status cards. Only a few cards reported that the soil status was normal in the case of NPK ratio.

Among the groundnut cultivators, one-third of them reported that the soil status was low and medium in the case of nitrogen and only meagre percent reported that it was normal. Two-fifths of cultivators said that there was high level of phosphorus content in their soil. About one-third of farmers expressed the view that it was normal. More than the two-thirds of the farmers reported that there was high level of potassium in their soil and only small number of farmers reported that it was normal.

The groundnut cultivator's use more urea compared to paddy cultivators as the government officials recommended the use of more urea for groundnuts. Paddy cultivators apply more DAP fertilizers compared to groundnut cultivations. The recommended doses of potash are higher for paddy cultivators than groundnut cultivators.

These inferences are drawn from the details health cards based on the soil tests. But in reality, a majority of paddy and groundnut cultivators did not adopt recommended doses of fertilizers. Only a small proportion of them followed recommended doses of fertilizers. The doses of fertilizers applied can be accessed through health card alone, not through the actual recommended doses of fertilizers' used by the farmers. The main reason for not adopting fertilizers is the practice of conservative method of cultivation. They feel that whenever they used more fertilizers they could get more production and they do not pay much attention to the soil fertility.

The split dose of urea recommended by the officials for paddy crop is larger in quantity than for the groundnut crop during basal application. The average quantity of split dose of urea recommended for groundnut crop per acre is larger than for paddy crop during inter-cultivation, vegetative growth and flowering stage. The average doses of DAP recommended are more or less the same for both the farmers. The dose of potash recommended is larger for groundnut than the paddy crop during basal application. The doses of potash recommended for groundnut crop are larger in quantity than for paddy during inter-cultivation through flowering stage.

The impact of application of recommended doses of fertilizers on production of paddy and groundnut production in Tamil Nadu is positively related in the study area. Among the soil tested farmers, the marginal farmers had obtained considerable benefits than the non-soil tested marginal farmers. The average value of output paddy cultivators earned was larger than the non-soil tested farmers. The higher percentage of value is reported by soil tested farmers to the tune of 5.9 percent as compared with non-soil tested farmers.

Among the soil tested paddy cultivators, the highest difference in value of output is registered by small farmers (8.6 percent) as compared with the non-soil tested small farmers. On the other hand, the percentage difference in the value of output of marginal non-soil tested farmers is only 1.3 percent compared with the value of output of soil tested farmers.

Among the groundnut cultivators, the average yield obtained by soil tested farmers is larger than that of the non-soil tested farmers. The average value of output, soil tested farmers obtained was more than the one obtained by the non-soil tested farmers. The large soil-tested farmers had obtained higher yield and the lowest yield was reported by marginal farmers. Among the non-soil tested farmers, the small farmers have recorded higher yield and minimum yield was obtained by marginal farmers. The percentage difference in average yield (quintal/acre) by large soil tested farmers and non-soil tested farmers was 24 percent. On the other hand, the difference in average output by marginal farmers was 7 percent.

The average yield per acre obtained by paddy cultivators, before and after applying recommended doses of fertilizers is estimated to be 20.9 quintal and 22 quintal. The percentage increase in yield is 5.1 percent. The averages

yield (quintal/acre) before and after applying recommended doses of fertilizers by soil tested farmers are 20.4 quintal /acre and 21.8 quintal/acre, respectively.

The percentage change in the yield for marginal farmers among paddy cultivators was the highest at 6.9 percent and for large farmers, the change was 3.4 percent. The marginal farmers apply the recommend doses of fertilizers in the small piece of land in a correct manner. The medium farmers got more yield than the marginal farmers before applying recommended doses of fertilizers. But after applying the recommended doses of fertilizers, marginal farmers got relatively higher yield than medium farmers. The marginal and small farmers enjoyed higher yield of paddy due to adoption of recommended doses of fertilizers in the study area.

Among the groundnut cultivators, the average yield for all the soil tested farmers who applied the recommended doses of fertilizers is 10.3 quintal/acre and 11 quintal/acre before and after applying the recommended doses of fertilizers. The marginal farmers have achieved larger output by 8.6 percent output after applying the recommended doses of fertilizers. On the contrary, the large farmers have recorded the lowest increase in 5.5 percent.

It is observed that the small farmers have produced the highest average yield per acre when compared with the marginal farmers before the application of recommended doses. After the application of the recommended doses, we find that in terms of percentage change the marginal farmers have recorded higher yield than the medium farmers.

About than two-thirds of the paddy cultivators reported improvement in grain filling as an important impact and three-fifths of them considered increase in crop yield as an important impact. A half of the farmers reported improvement in soil texture and improvement in crop growth as the most important changes. It shows that application of recommended doses based on soil test is essential to increase the productivity of land.

We find that increase in crop yield, improvement in soil texture, improvement in crop growth and improvement in grain filling are significant positive changes observed after the application of recommended doses of fertilizers on the basis of soil test in the cultivation of paddy. A large number of groundnut cultivators reported the improvement in crop growth, increase in crop yield and improvement in grain filling as important changes observed after the application of recommended doses of fertilizers.

There is no doubt that adoption of recommended doses of fertilizers on the basis of soil tests had a positive impact in increasing the productivity of soil and production of crops, namely paddy and groundnuts in the area of study.

9. Conclusions and Policy Recommendations

Though the scheme as a whole has succeeded, a few drawbacks that can be remedied have been observed. The soil-tested and non-soil tested farmers have undergone faced hardships in availing of the benefits of the scheme. The following are some of the specific policy suggestions:

- The state government needs to simplify the soil testing process. Otherwise, farmers have to face much hardship and many miss the scheme.

- The state government must take all the necessary steps to ensure that soil testing is done free of cost to all the farmers.

- The state government needs to ensure the adequate financial support to the farmers for the purchase of farm inputs within the prescribed time. It needs to reduce the fertiliser's prices like urea, DAP, potash and others.

- The state government must create awareness about the soil testing scheme among the farmers.

- The state government should start the village level demonstration programme for soil testing at the village level.

- The state government needs to ensure the cultivation of various crops based on the soil tests.

- The government should conduct training programme for the farmers about the soil testing process and the recommended doses of fertilizers at the panchayat level by conducting camps.

- The state government must create separate section for the soil testing laboratories at least at the taluk level.

- The government should update the technology for soil testing in the existing district level laboratories.

- The government should provide mobile soil testing laboratories at the block level and soil tests to be conducted at the village level. The result of the tests is to be given in a day.

- The government should have separate officer for soil testing purpose at the taluk level.

- As private dealers charge exorbitant prices during the season. The state government should take steps to increase the supply of fertilizers and meet the demand of the farmers.

- The government should oversee whether recommended doses of fertilizers of split doses are applied at least monthly once.

- The government instruct the follow farmers recommended doses of fertilizers as to majority of farmers are not following the recommended split doses.

- All the farm inputs are to be given in time by the Agricultural Department of the Government of Tamil Nadu and cooperative societies.

- The state government should educate the farmers about the benefits of soil testing through the media.

- The results of the soil testing analysis are to given in time for the farmers. The majority of them could not get the results in time.

- The soil testing laboratories are to be created within 15 kms for easy access.

- The government should appoint separate Agricultural Officers for soil testing in every block for organising soil test process.

- There is urgent need for filling up all vacant positions in the soil testing laboratories.

- Tamil Nadu Agricultural University may establish Soil Management Centre in every district.

- The government should take more steps to create awareness about the importance of recommended doses of fertilizers and set at regular intervals whether the recommended doses of fertilizers are used.

- The results of soil testing are to be given authentic value of soil health status in particular soil. The results are to be given within a month.

- Agricultural Official is to be given guidelines about the soil testing process and application of split doses of fertilisers.

- The Government official is to be given information about the importance of the soil test to the farmers.

- The Government Official is to be given training relating how to apply to soil testing and split doses of fertilizers in every village.

- The soil testing officials is to be really collect the soil and originally test it and given correct results to the farmers

- The Government Official is to be avoiding the general results of the particular soil in a locality.

- The Agricultural Official is to be check whether farmers adopted the recommended doses of fertilizers and its application in their farm field.