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Analysis of Soil Properties, Nutrients and Structure of the Soil Samples From Agriculture and Non-Agriculture Area

KEYWORDS: Soil, Properties, nutrients, structure, texture, SEM.

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ABSTRACT *This paper presents a study of soil test to short out the nutrient deficient areas from Non-deficient one and is well recognized as a scientific means for quick characterization of the fertility status of soils and predicting the nutrient requirement of crops. The properties of PH, EC, NPK of the soil samples are measured by using the laboratory methods. The structure and texture of the soil samples determined by scanning electronic microscopy. It was shown that soil particles have porous structure and dimensions in the range from several millimeters to several hundreds of Nano meters.*

INTRODUCTION

Soil is the mixture of minerals, organic matter, gases, liquid and the countless organisms that together support life on earth. It is a natural body known as the Pedosphere and which performs four important functions as a medium for plant growth, as means of water storage, supply and purification as a modifier of the atmosphere of Earth.

A soil provides readily available nutrients to plants and animals by converting dead organic matter into various nutrient form. Soil on depends on various properties, Structure, Density, porosity, consistency, temperature, color and resistivity.

Nitrogen helps the plant foliage to grow strong. Phosphorous helps roots and flowers to grow and develop. Potassium is important for overall plant health.

Without proper soil aeration, mineral, nutrients and other factors, plants may not be able to absorb phosphorous and potassium anyway. So, loading of soil with high level of phosphorous and potassium may not make much difference with the health of the plant.

The soil pH is the negative logarithm of the active hydrogen ion (H^+) concentration in the soil solution. It is the measure of the soil acidity or neutrality. It is a simple and very important estimation for soils. Soil pH influence to a great extent for the availability of nutrients crops. It also affects microbial population in soils. Most nutrient elements are available in the pH range of 5.5 to 6.5

The electrical conductivity is a measure of the ionic transport in solutions between the anode and cathode, this means the EC is normally considered to be a measurement of the dissolved salt in a solutions. The Nano structure of the soil samples were determined by using the scanning electron microscope.

Pore space is that part of the bulk volume of soil that is not occupied by either mineral or organic matter but is an open space occupied by either gases or water. The total pore space should be 50 percentage of the soil volume the gas space is needed to supply Oxygen to organisms decomposing organic matter, humus and plant roots.

Mechanical elements of the soils have a mutual difference in the dimensions, shapes. Particle dimensions are in the range from several millimeters to several hundreds of Nanometers.

EXPERIMENTAL

The investigated soil samples were collected from agricultural (field side) and non-agricultural area (road side) located at Pichandarkovil, No.1 Tollgate.

A slice of the plough layer of the soil is cut at intervals of 15-20 steps or according to the area to be covered. Generally 10-20 spots must be taken for one composite sample depending one the size of the field. A V- shaped cut was made with a spade to remove 1 to 2 cm slice of the soil. The sample was collected on the blade of the spade and put in a clean bucket.

The soil was poured from the bucket on a piece of clean paper and mixed thoroughly. The soil was spread evenly and divided it into four quarters. Rejected top opposite quarters and mixed the rest of the soil again. The process was repeated till left with about half kg of the soil, collect it and put in a clean cloth bag.

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The pH of the soil was measured by using the pH meter with a range of 0-14 pH. Soil is taken in moisture of percentage. Electrical conductivity was measured by EC meter. Nitrogen was measured by using Kjeldahl method. Phosphorous was measured by using Olsen's method. Potassium was measured by using flame photometer. Structure of soil was measured by using scanning electron microscope.

RESULTS AND DISCUSSION

Properties of soil samples are shown in Table 1

Table 1 shows that the EC, PH value of Sample 2 is high in compare to the sample1 so the sample2 (Road side sample) is very hard to cultivate.

Nutrients of the soil samples are shown in Table 2

Table 2 shows that the N,P,K content in the field side soil is observed as 67.2,7.0 and 117 percentage respectively. Similarly the values for the road side soil there is a slight difference observed in both nitrogen and phosphorous content. Pottassium content is varied about 15 percentage from the experiment results presence of NPK content in the field side soil may be due to regular usage of fertilizers for cultivation which is not possible on the roadside

Recommendation for micro nutrients inputs for sample 1 and sample2 shown in Table3

As per the Table 3 results shows that sample1 (field side sample) requires less micronutrients compare to the sample 2(road side)

Mechanical elements of the soils have a mutual difference in their structure, physical properties and nutrients. Particle structures are in the range from several millimeters to several hundreds of nanometers. Nano structures of the sample 1 and sample 2 with different magnification ranges are shown in the Fig.1(a) at 10000 magnification, Fig.1(b) at 20000 magnification, Fig.1(c) 30000 magnification, Fig,1,(d) 50000 magnification. Fig.2(a) at 10000 magnification, Fig.2(b) at 20000 magnification, Fig.2(c) 30000 magnification, Fig,2,(d) 50000 magnification.

Table 1 Properties of soil sample1 and sample 2.

SI No	Properties	Sample 1	Sample 2
1	EC	0.09	0.1
2	PH	7	7.8

Sample 1: Field side sample
Sample 1: Road side sample

Table 2: Represents the analysis of the primary nutrients of sample 1 and sample 2.

S.No	Name of primary nutrients	Sample 1	Sample 2	Different b/w the samples%
1	N	67.2	68.6	1.4
2	P	7	9	2
3	K	117	102.5	14.5

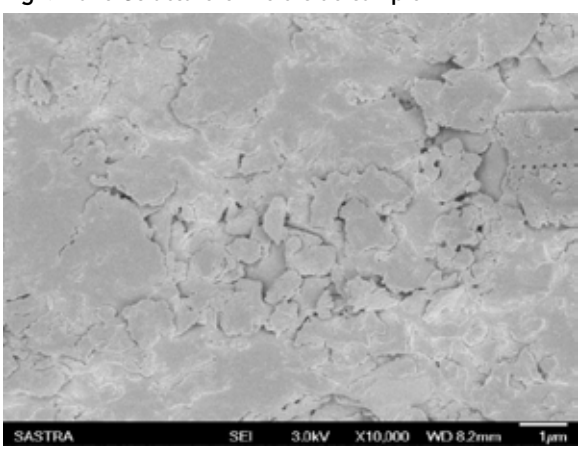
Sample 1: Field Side Sample.
Sample 2: Roa d Side Sample.

Table 3: Recommendation for Micro nutrients inputs for sample 1 and sample 2.

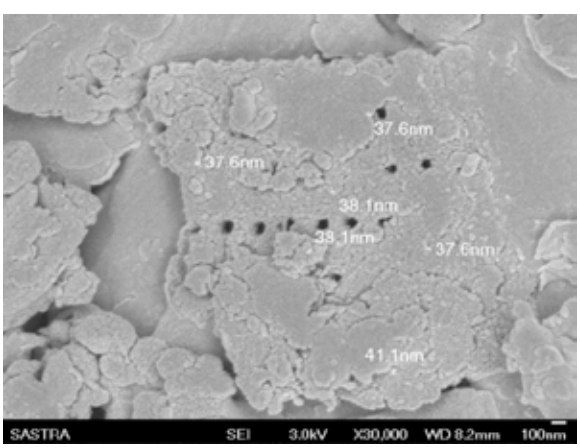
S.No	Macronutrients	Sample 1	Sample 2
1	N	127	196
2	P	38	46
3	K	57	371
4	Urea	279	345
5	Superphosphate	238	236
6	Muriate of Potash	95	120

Sample 1: Field Side Sample.
Sample 2: Road Side sample.

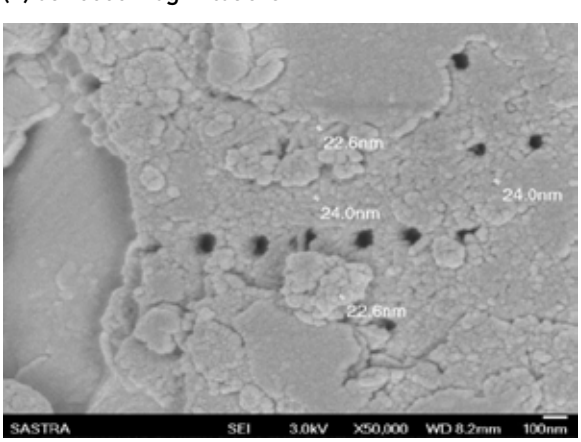
Fig1: Nano Structure of field side sample



(a)at 10000 Magnifications.



(B) at 20000 magnifications



(c) at 30,000 magnifications

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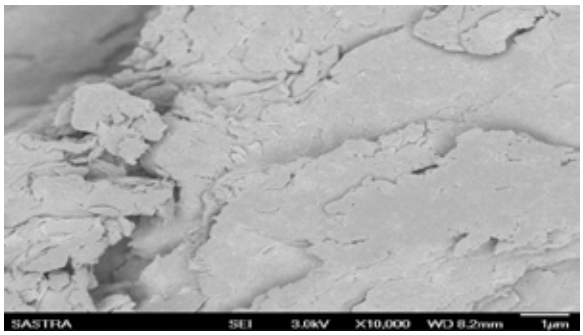
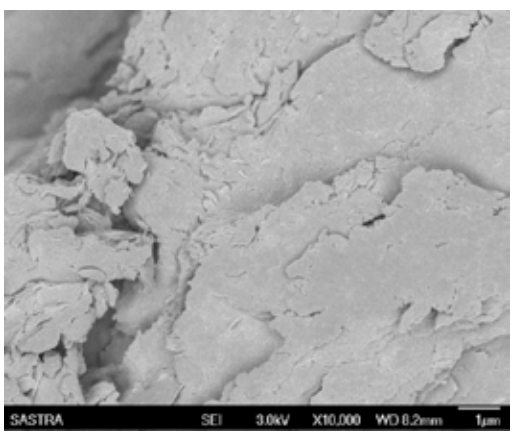
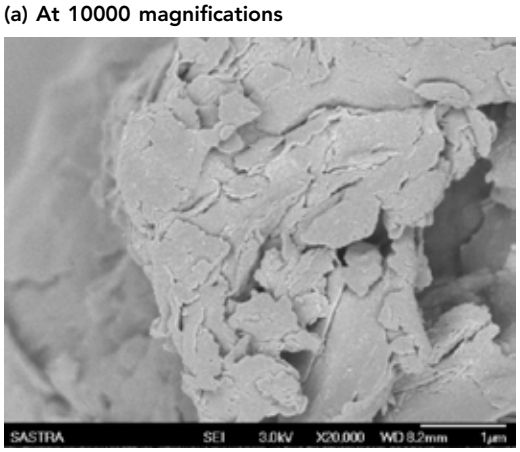


(d) at 50000 magnifications

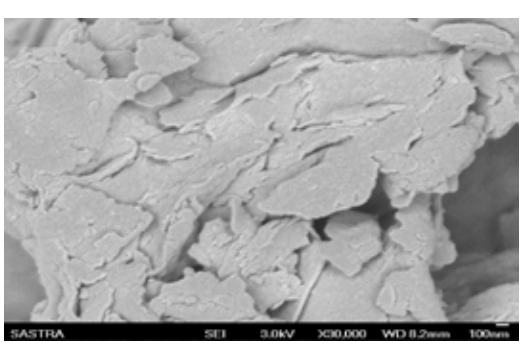
Fig (2)Nano Structure of Roadside sample



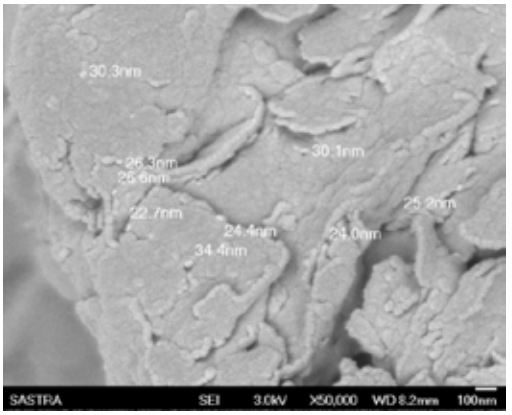
(a) At 10000 magnifications



(b) at 20000 magnifications



(c) at 30000 magnifications.



(d) at 50000 magnifications

Conclusion

Tested soil samples taken from non agriculture area (road side) show that the alkalinity behavior and sandy nature. The sample taken from agricultural area show that neutral in nature. The electrical conductivity value impels the presence of excess nitrogen with exchangeable sodium, which will minimize the fertility of the soil. N,P,K content also found to be within the range of normal value. From the SEM analysis report the structure of soil shows the porous nature of the tested soil. The roadside soil sample have maximum porous in its structure compare to the field side soil sample. The maximum porous indicates the roadside soil sample is sandy soil and field side soil sample is clay soil. Sandy soil is not suitable for proper cultivation.

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