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Study of Soil Analysis in Different Region nearby the Parbhani, Maharashtra

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Abstract: *The soil is one of the most important ecological factors showing its impact on the terrestrial environment either directly or indirectly. It forms the top most layer of earth's crust and is a mixture of many solids, liquid and gaseous substances which differ from place to place. It has both non-living and living matter like mineral particles, decaying plant remains and insects occurring together with countless bacteria on its organic matter.*

Soil test commonly refers to the analysis of a soil sample to determine nutrients content, composition and other characteristics such as the acidity or pH level. A soil test can determine fertility or the expected growth potential of the soil which indicates nutrients deficiencies, potential toxicities for excessive fertility and inhabitations from the presence of non-essential trace minerals. The test is used to the function of roots to assimilate minerals. The expected rate of growth is modeled by the law of maximum. Composite sampling can be performed by combining soil from several locations prior to analysis. This is a common procedure, but should be used judiciously to avoid skewing results. This procedure must be done so that government sampling requirements are met. A reference map should be created to record the location and quantity of field samples in order to properly interpret test results. Soil testing is often performed by commercial labs that offer a variety of tests, targeting groups of compounds and minerals. The advantage associated with local lab is that they are familiar with the chemistry of the soil in the area where the sample is taken. This enables technicians to recommend the test that are most likely to reveal useful information.

Key words: *Study, Soil analysis, Region, Parbhani*

I. INTRODUCTION:

Environmental chemistry was the scientific study of the chemical and biochemical phenomena that occurs in natural places. It should not be confused with green chemistry, which seeks to reduce potential pollution at its source. It can be defined as the study of sources, reactions, transport, effects and fates of chemical species in the air, soil and water environment. The soil was not a mass of dead debris, merely resulting from the physical, chemical and biological weathering of rocks; it was a more or less homogeneous system which has resulted from the decomposition of plant and animal remains.[1]

Parbhani is located in Marathwada region of Maharashtra state, farmers from this region are suffering from infertility of soil and low crop yield. Marathwada region was also known in India for large number of farmer's suicide. So by checking the soil nutrients (N, P, K) pH, and E.C. we can find out the nutrient value of soil and necessary action can be taken to increase the soil fertility and it also helps to select the crops suitable for that soil. We can also check the microbial flora in the soil such as nitrogen fixing bacteria, phosphate solubulizing bacteria, etc to decrease the use of chemical fertilizers.

Soil pH was an indication of acidity or alkalinity of soil and is measured in pH units. The pH scale goes from 0-14 with pH 7 as the neutral point. As the amount of hydrogen ions in the soil increases, the soil pH decreases, thus becoming more acidic. From pH 7 to 0, the soil was increasingly more acidic, from pH 7 to 14, the soil was increasingly. In mineral soils, pH was a general indicator of soil nutrient availability, presence of free lime (calcium carbonate), presence of excess sodium and excess hydrogen.

II. MATERIAL AND METHODS:

Collection of soil sample & soil collecting tools. [2,3]
Collection of soil sample: Purpose of Collection soil sample:-

- Soil sample are collected from the filed
- To study the soil type.

- To evaluate the fertility of the soil.
- To know the genesis of soil.

2.1 Sample Technique: The method of sampling depends largely on the purpose for which, it was to be collected. In the case of manures & crops experiments sampling technique is quite different. When general fertility was to be found out, numbers of sample to be collected vary according to size of plot. However 10-15 sample/ha^{-1} are advice for such experimental Purpose. For field crops like Soybean, cotton, sugarcane 20 cm layer wise.

- First divide the field according to the slope, color, depth, texture, management &cropping patter. After demarcation of field into uniform portion each of this must be sampled
- Then divide each unit in four parts. Draw the zigzag line having about 5 to 7 corner on both the sides of middle line so that it will cover the whole area.
- Where the crops have been planted, collect the soil sample between the lines.
- Do not sample unusual area. Avoid area recently fertilized,.
- Use proper sampling tools like soil tube, phawada (spade) or khurpi (trowel).
- Before taking the sample, away surface; litter or any stone etc. collect the soil samples from 05 to 10 spots in the field depending upon the area. At each corner of the zigzag line take the sample by augur at the depth of 15-20cms or with the help of trowel & spend by digging "v" shaped hole up to plow/plough depth. Then cut out uniform thick 2cms slice of soil from bottom to top of exposed soil surface, collect the sample on the blade or in your hand & place it in clean bucket.
- Collect the sample from the uniform area into this same polythene bags.
- Pour the soil from the polythene bag on a piece of clean paper or cloth & mix thoroughly.
- Discard by quartering, excess of soil and collect.
- To quarter the sample, mix well divide into four equal parts & Reject opposite quarter.
- Mix the remaining two portions & repeat the procedure as many time a necessary to arrive at specific size sample.
- If the sample was wet or moist, dry it in the shade before putting into sealed plastic bags. Fill the sample into plastic bag & put the plastic bag into cloth bag.

2.2 Determination of calcium by EDTA titration method from soil sample [4,5] :

The extent of sodium hazard in irrigation water was determined in terms of' sodium concentration in relation to the two useful divalent cations namely Ca^{++}. The most common method of calcium and determination in irrigation water is by complex metric titration using sodium salts of ethylene-diamine terra acetic acid. (EDTA).

2.3 Reagents:

1) Standard calcium chloride solution (0.1N): Dissolved exactly 0.500 gm of A.R. grade $CaCO_3$ (dried at 1500C) in minimum (about 20 mi) of 0.2N I-ICI (AR). Boil gently to expel the CO_2. Then make the volume accurately to one liter.

2) Eriochrome Black T Indicator: Homogenize 0.5 gm of EBT in 100 gm of Kcl or Nacl. Eriochrome blue black — B, 0.5% in ethanol. Dissolve 0.5 gm Eriochrome blue-black —B in 100 ml of 95 % of ethanol. Sodium Hydroxide (10%) : Dissolve 10 gm of NaOH in 100 ml of distilled water

3) Murexide Indicator: Take 0.5 gm of murexide (also known as ammonium purpuate) and mix it with 40gm of powdered potassium sulphate. The indicator was kept in powdered form as it goes oxidation in the solution form

4) Take 50 ml water sample in 100 ml of conical flask and dilute the content by adding about 25ml of distilled water.

2.4 Physical parameters:

Determination of pH soil sample: The pH is usually measured by pH meter, in which the potential of hydrogen ion indicating electrode (Glass electrode) was measured potentiometrically against calomel saturated reference electrode which also serves as salt bridge. Now days, most of the pH meters have single combined electrode. Before measuring the pH of the soil, the instrument has to be calibrated with standard buffer solution of known pH. Since, the pH was also affected by the temperature; hence, the pH meter should be adjusted to the room temperature of the solution.[6,7]

2.5 Reagents:

Standard buffer solutions: These may be of pH 4.0, 7.0 or 9.0 and are prepared by dissolving one standard buffer tablet in 100 ml distilled water, it was necessary to prepare fresh buffer solution after few days. In absence of buffer tablet, a 0.05 M potassium hydrogen phthalate solution can be used which gives a pH of 4.0.

Procedure:

l. Take a 1 gm of soil sample and weight, transfer to test tube.
2. Add some distilled water and stirred for 20 min.
3. Take pH meter and Deep into the solution by slowly.
4. pH change color and that pH paper metrics with pH meter.

III. RESULT AND DISUSSION:

3.1 ELECTRICAL CONDUCTIVITY

The electrical conductivity of soils varies depending on the amount of moisture held by soil particles. Sands have a low conductivity, silts have a medium conductivity, and clays have a high conductivity. Consequently, EC correlates strongly to soil particle size and texture. EC Effect [8,9]

No deleterious effect on crop
1-2 - Critical for salt sensitive crops
2-3 - Critical for salt tolerant crops >3 - Injurious to most crops

3.2 NITROGEN [10] :

Nitrogen represents Life. It was an ingredient of proteins and distinguishes them from carbohydrates. Carbohydrates are passive, storing energy or providing physical structure, but proteins control the movement of energy and materials and the growth of the plant. Sugars, starches and cellulose are carbohydrates; chlorophyl, enzymes, and hormones are proteins, Inasmuch as proteins influence food quality as well as quantity, nitrogen has a predominant role among the soil nutrients. Due to this reason, plants evolved to render the metabolism of nitrogen first in priority among all other processes.

3.3 PHOSPHOROUS [11] :

Phosphorus is essential for the general health and vigor of all plants. Some specific growth factors that have been associated with phosphorus were: Stimulated root development
Increased stalk and stem strength Improved flower formation and seed production. More uniform and earlier crop maturities the growing season affect both seed development and normal crop maturity.

3.4 POTASSIUM [12,13] :

Potassium has many different roles in plants:
In Photosynthesis, potassium regulates the opening and closing of stomata, and therefore regulates CO_2 uptake. Potassium triggers activation of enzymes and was essential for production of Adenosine Triphosphate (ATP). ATP was an important energy source for many chemical processes taking place in plant issues. Potassium plays a major role in the regulation of water in plants.

Table- 1 Soil Testing Report for Sample I (Pedgaon)

Soil Testing Parameters	Rating
P^H	7.042
Electrical conductivity	2.356 mho^{-1}
Organic Carbon	0.70 %
Nitrogen	82.3 $kgha^{-1}$

Table- 2 Soil Testing Report for Sample1I (Dharmapuri)

Soil Testing Parameters	Rating
P^H	7.043
Electrical conductivity	2.341 mho^{-1}
Organic Carbon	0.75%
Nitrogen	83.9 $kgha^{-1}$

Table -3 Soil Testing Report for Sample 1II (Nandkheda)

Soil Testing Parameters	Rating
P^H	7.045
Electrical conductivity	2.346 mho^{-1}
Organic Carbon	0.85%
Nitrogen	84.1 $kgha^{-1}$

Table -4 Microbial Activity of Soil

Sr.No.	Sample Soil	Nitrogen Fixing Organism	PSB Bacteria
1	Pedgaon	Present	Absent
2	Dharmapuri	Present	Present
3	Nandkheda	Present	Absent

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REFERNCES:

[1]. Joel OF, Amajuyoyi CA. Determination of Selected Physicochemical Parameters and Heavy Metals in a Drilling Cutting Dump Site at Ezeogwu—Owaza, Nigeria Chhabra G., *Res. J Chem.Sci.,* January 2014.

[2]. Anu Upadhyaya S K, Bajpai Avinash. Seasonal Analysis of Soil Sediment of Shahpura Lake of Bhopal (M.P.). International Journal of Environmental Science and Development, October. 2010.

[3]. Osakwe S. A. Evaluation of Physicochemical Characteristics of Soils in the Flood Disaster Affected Areas of Isoko Region of Delta State, Nigeria. IOSR *Journal of Applied Chemistry* (IOSR-JAC). Vol. l. 2014;7(5), PP 24-31.

[4]. Rajesh P Ganorkar, P G Chinchmalatpure. Physicochemical Assessment of Soil in Rajura Bazar in Amravati District of Maharashtra (India) *International Journal of Chemical, Environmental and Pharmaceutical Research* December. 2013.

[5]. Marathe R.B., Marathe Y.V., Sawant C.P., (2011), Sediment characteristics of Tapti River, Maharashtra, India, *International Journal of Chem Tech Research*, Vol. 3, No.3,**PP** 1179-1183.

[6]. Patel V. and Parikh P., (2012), Assessment of soil quality parameters and heavy metal load in Mini River Basin, Vadodara, *International Journal of Environmental sciences,* Vol 3, No 1.

[7]. Solanki H.A. and Chavda N. H., (2012) Physico-Chemical Analysis With Reference To Seasonal Changes In Soils Of Victoria Park Reserve Forest, Bhavnagar (Gujarat), *Life Sciences Leaflets,* Vol.8, **PP** 62-68.

[8]. Methods Manual, (2011). Soil Testing in India, Dept. of Agriculture and cooperation, Ministry of Agriculture, Government of India, New Delhi

[9]. Patil J.D. and Shingte A.K. (1982). Micronutrient status of soils from drought prone area of Pune region (Maharashtra).*J. Indian Soc. Soil sci*. 7(3).

[10]. Athokpam, H.S., Nongmaithem, J., Kumar, D., Singh, Y.K., Naorem, B.J., Devi, T.R. and Devi, L. (2013) Soil macro- and micro-nutrient status of Senapati district, Manipur (India). *African Journal of Agricultural Research*, **8** (39), **PP** 4932-4936.

[11]. Bray, R.H. and Kurtz, L.T. (1945) Determination of total, organic and available forms of phosphorus in soils. *Soil Science*, **59**, PP 39-45.

[12]. Yadav, J.S.P. (2003) Managing soil heath for sustained high productivity. *Journal of the Indian Society of Soil Science.***51** (4) ,PP 448-465.

[13]. Tharavathy, N.C.,A Study on Soil Characteristics in Urban and Rural Areas of Mangalore,Karnataka,.IJRES,Volume 2,Issue 2,2016,PP 5-8.