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PHYSICO CHEMICAL ANALYSIS OF SOIL IN THE DIFFERENT REGION OF NAGPUR

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ABSTRACT:
A soil test determines the soil's nutrient supplying capacity by mixing soil during the analysis with a very strong extracting solution (often an acid or a combination of acids). The soil reacts with the extracting solution, releasing some of the nutrients. As soil supplies most of the mineral nutrition for higher plants through the plant's root system, the extracted nutrient concentration is evaluated based on research that relates plant utilization to soil nutrient concentration.

Keywords: Physico Chemical, Soil, Nagpur.

INTRODUCTION:
Soil analysis can provide important information about physical conditions, fertility (nutrient) status, and chemical properties that affect a soil's suitability for growing plants. Four steps associated with soil testing include: 1) soil sample collection, 2) laboratory analysis, 3) interpretation of results, and 4) fertilizer or other management recommendations. We'll look at soil sample collection and analysis (A. L. Miller 'R.I-I. and Keeney D.R.). ZA soil test determines the soil's nutrient supplying capacity by mixing soil during the analysis with a very strong extracting solution (often an acid or a combination of acids). The soil reacts with the extracting solution, releasing some of the nutrients (Detwiler, R.P.). As soil supplies most of the mineral nutrition for higher plants through the plant's root system, the extracted nutrient concentration was evaluated based on research that relates plant utilization to soil nutrient concentrations this works well for some nutrients, but was less accurate for others(Bouwman, A.F.). Nutrients supplied from soil organic matter (0M) decomposition (such as nitrogen and sulfur) depend more on the rate of 0M decomposition than on extractable levels of these nutrients (John Wiley & Sons). Standard or routine soil tests vary from laboratory to laboratory, but generally include soil texture; electrical conductivity (EC, a measure of soil salinity); soil pH; available phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg); sodium(Na); cation exchange capacity (CEC); and often an analysis of 0M content (Bradbury, N.J. & powlson, D.S.). Most laboratories offer nitrogen (N), sulfur (S), and micronutrient analyses for additional cost. The methods used to tested soils vary depending on soil chemical properties which are affected by geographic region (Piper C S). A listing of local soil test laboratories that used methods suitable for local soils can be found in the University of Arizona publication, "Laboratories Conducting Soil, Plant, Feed or Water Testing".

STANDARD SOIL TESTS: - Soil Texture Soil texture reflects the amounts of various sized particles (sand, silt, and clay) in the soil(Nyle C. Brady). Relative amounts of these particles are used to categorize soil into textural classes. Listed generally from most clayey to most sandy these are clay, salty clay, sandy clay, salty clay loam, clay loam, sandy clay, loam, sandy clay loam, silt, silt loam, sandy loam, loamy sand, and sand (Ali M.A, Baugh P.J). Clayey soils hold more water and nutrients, but are more difficult to till and may absorb water very slowly. Sandier soils accept water quickly, are easy to till, but hold little water and may require frequent irrigation and fertilizer application.

MATERIAL & METHODS:
Study area chosen for present investigation was located at Latitude and longitude coordinates of 21.146633, 79.088860 and GPS coordinates of 210 8'47.8788" N and 790 5' 19.8960" E. Nagpur was the capital city of Maharashtra state, India, a very important political and cultural center of

the country. It was known as "Orange city" since it was a major center of orange cultivation. Many experts name Nagpur city to be geographical center of India. Nagpur Limits encompass 217.56 Square km of land areas. Nagpur was 837 km. From Mumbai, 1094 km south of Delhi, 1092 km north of Chennai and 1140 km west of Calcutta. Humidity ranges from 20% to 70% and Rainfall averages 120cms annually. Nagpur is situated 274.5 mt to 652.70 mt above sea level and 28% of Nagpur is covered by Forest. Nagpur generally has a dry tropical weather.

The climate of Nagpur follows a typical seasonal monsoon weather pattern. The peak temperatures are usually reached in May/June and can be as high as 48^0C. The onset of monsoon was usually from July and the season extends up to September, with monsoon peaking during July and August. After monsoons, the average temperature varies between 27^oc and approx 6 to 7^oc right through December and January.

The underlying rock type in the Western and Southern localities was Deccan Trap; the lava flows gave rise to flat topped and terraced features. The Eastern half's covered by crystalline Metamorphic Rock such as gneiss's, schist and granites. In the Northern part Of the city, yellowish sand stones and clays of the lower Gondwana formations are found, In maximum part of the town, the underlying rock strata are covered with alluvial deposits resulting from the flood plain of the Kanhan River. In some places these gives rise to granular, sandy soils, but in many places, particularly in low lying, poorly drained areas, the soils are alluvial clays with poor permeability characteristics

Geomorphology and Soil Types:-

The district forms part of Deccan Plateau having flat topped and terraced features. Eastward and northeastwards the landscape changes due to the change in the underlying rocks. The rocks of Gondwana series present a low rolling topography with a poor soil cover and vegetation. On the north the upland ranges are the extension of Satpuras which gradually narrows down towards west. South of these upland range stretches the Ambegad hills, the western extremity of which was the Nagpur district. The Ramtek temple was on the spur of this range. The Girad hill range extends along the southeast and separates the valley of the Kar from that of Jamb up to Kondhali. Another main hill range runs northwards through Katol taluka from Kondhali to Kelod separating the Wardha and Wainganga valleys (Butterfly, C.R. , J.A. Baldock, and C. Tang). The northeastern and east central parts of the district were drained by the Wainganga and its tributaries (Dr. Dalwadi M.R. Dr. Bhatt V.R.). The central and western portion was drained by the Wena which was a tributary of Wardha River. There are six types of soils found in Nagpur district. The details are as follows:

1. Black soils: These are black cotton soils which are fine grained clayey in texture and varies in depth from 1 m to 6 m or more and retain moisture. They are found around Kalmeshwar, Saoner and Nagpur.
2. Morand soils: These are predominant in the district. They are black cotton soils with higher percentage of lime than the Kali soils. They are black, grey or light to dark brown in colour, clayey in texture and have a depth of about 1to 3 m.
3. Khardi soils: They were shallow soils mixed with sand and found mainly in hills. These are grey in colour, clay loam in texture.

PROCEDURE:-

- First divide the field according to the slope, colour, depth, texture, management & cropping patter. After demarcation of field into uniform portion each of this must be sampled separately.
- Then divide each unit in two parts. Draw the zigzag line having about 8 to 10 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, Old bund, marshy spots, near trees, compost heaps or the no representative location.
- Use proper sampling tools like auger, soil tube, phawada (spade), or khurpi (trowel).
- Before taking the sample, scrape away surface; litter or any stone etc. collect the soil samples from 10 to 20 spots in the field depending upon the area. At each corner of the zigzag line take the sample by auger 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 bucket.
- Pour the soil from the bucket on a piece of clean paper or cloth & mix thoroughly.
- Discard by quartering, excess of soil and collect approximately 1 kg. Of soil.
- To quarter the sample, mix well divide into four equal parts &Reject opposite quarters.
- Mix the remaining two portions & repeat the procedure as many time a necessary to arrive at the desired size sample.
- If the sample was wet or moist, dry it in the shade before putting into plastic bags.
- Fill the sample into plastic bag & put the plastic bag into cloth bag.
- Fill out the information sheet completely & pack inside the sample bag & put one outside the bag
- Determination of electrical conductivity of soil sample.

Principle: the method based on the principle that conductivity of soil nearly proportional to salt concentration.

Reagent: Standard potassium chloride solution: 0.7456g of dry reagent grade potassium chloride was dissolved in freshly prepared double distilled water & made to one liter. At 25^0C it gives an electrical conductivity of 1411.8 x 10-6 mhos/cm. the conductivity bridge was to be calibrated & cell constant determined with the help of this solution. Even if the scale s marked directly in mho/cm it was necessary to check & calibrate the instrument with KCl solution.

- Procedure: 10g of soil was shaken intermittently with 25ml of distilled water n 150 ml conical flask for 1 hr & allow to stand. Alternatively the clear extract after pH can be used for electrical conductivity measurement. The conductivity of supernatant liquid is determined with the help of salt bridge. The measurement of EC is to be adjust for now temperature of the solution by setting the knob provided for this purpose,
- Determination of organic carbon by wet oxidation method from soil sample.

The organic in organic matter is oxidized excess of chromic acid. The excess chromic acid not reduced by organic matter determined by back titration with standard $FeS0_4$ solution using diphyphylamine. The organic carbon n soil was calculated from the chromic acid utilized by it.

Reagents:

1. Potassium dichromate solution (1N): dissolved 49.04gm of dried reagent grade potassium dichromate in distilled water & dilute to 1 liter.
2. Ferrous sulphate solution (l N): Dissolve 139 g of reagent grade FeS04. 7H20 in distilled water & dilute to conc. H2S04 cool & dilute to 1 liter.
3. Sodium fluoride.
4. Indicator: dissolve 0.5g diphylamine in 100ml conc. H_2S0_4
5. Conc. H_2S0_4

Procedure:

1. Weight accurate 1 g of finely ground soil sample having passed through 0.5mm sieve on a dry watch glass & transfer it without loss to 500ml conical flask.
2. Add exactly 10mlof $K_2Cr_20_7$ solution by pipette & 20m] conc.H_2S0_4 by mean of measuring cylinder.
3. Stir the content gently for 1 min & kept it aside for half an hour in asbestos sheet.
4. At the half an hr adds 200 ml distilled water & 1 teaspoonful NaF.
5. Add 1ml diphynlamine indicator & shake the content of the flask.
6. Titrate the content of the flask against std. $FeS0_4$ solution taken in burette till violet colour change to green note the burette reading at this point.
7. Carry out the blank (Without soil) simultaneously in the same way.

RESULT AND DISSCUTION

In a broad sense, soil testing was any chemical or physical measurement made on a soil. Soil testing may, therefore, be defined as a tool for rapid soil chemical analysis to access the available nutrients status & tilth of soil, Interpretation of soil test result & making fertilizer recommendations are based on crop responses & economic consideration

Phase of soil testing:

- Collection of soil sample from field
- Extraction & determination available nutrients
- Interpretation of analytical result, &
- Making fertilizer recommendation

Fertilizer recommendation from soil test crop response studies:

The research support to soil advisory service comes from soil test crop response correlation studies conductivity in different soil-agro climate regions. System studies on these lines were initiated under the all India co- ordinate soil test crop response correlation project of Indian council of agriculture research, New Delhi from 1968 at mahatma phule krishi vidyapeeth, rahuri.

Objectives of soil test crop response program:

- To establish significant relationship between soil test for available N, P, & K, yield responses of important crop of the region.
- To derived the yield targeting equation for important crops or making fertilizer recommendation considering financial condition of farmers.
- To evaluate the various soil test method for their suitability under field condition.
- To evaluate the conjoint use of chemical fertilizer & organic manures for enhancing nutrient use efficiency & To drive basis for making fertilizer recommendation for whole cropping sequence basedon initial soil test values.

CONCLUSION

A highly productive soil will produce more total biomass than a less productive soil. If much of this biomass remains in the field, then the soil was likely to have a higher SOM content than a less productive soil. In this section, a SOM test is redundant. It tells the grower what is already known, "the soil was more productive." unlike extractable nutrients, soil pH, or soluble salts, there were critical level below which crop yield are severely limited. Any factor that increases total biomass production will ultimately increase SOM to some point where climate, geography and management practices limit further increase. The benefits of higher SOM are often mentioned in association with good soil end crop management. Increased soil aggregation, improved drainage in fine textured soils, better water- holding capacity in sandy soils, higher cation exchange capacity, increased nutrient reserves etc. although most unproductive soil can be improved with large addition of organic matter (Wallace et al, 1990) maintenance of SOM for the sake of maintenance alone was not a practical approach to farming.

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SOIL TEST REPORT FOR SAMPLE 1:

Swawalambi Nagar, Nagpur

Soil testing parameter	**Rating**
pH	7.044
Electrical conductivity	3.125 mho-1
Organic carbon	0.90%
Nitrogen	86.6 kgha-1

SOIL TEST REPORT FOR SAMPLE 2:

Hingna, Nagpur

Soil testing parameter	**Rating**
pH	7.079
Electrical conductivity	3.075 mho-1
Organic carbon	0.70%
Nitrogen	85.46 kgha-1

SOIL TEST REPORT FOR SAMPLE 3:

Trimurti Nagar, Nagpur

Soil testing parameter	**Rating**
pH	7.981
Electrical conductivity	3.140 mho-1
Organic carbon	0.82%
Nitrogen	87.04 kgha-1

Microbial Activity of Soil:-

Sr. No.	**Sample of Soil**	**Nitrogen Fixing Organism**	**PSB Bacteria**
1	**Swawalambi Nagar**	Present	Absent
2	Hingna	Present	Present
3	Trimurti Nagar	Present	Absent