RESEARCH PAPER | Chemistry | Volume : 5 | Issue : 9 | September 2015 | ISSN - 2249-555X

# Analysis of Soil Quality Using Physico-Chemical Parameters of Shehra Taluka District : Panchmahals (Gujarat)

KEYWORDS: Quality of soil, EC, PH, OC, P.K, Shehra Taluka

**K. P. Patel**

Department of Chemistry, Shri P.N.Pandya Arts,M.P.Pandya Science & Smt.D.P.Pandya Commerce College, Lunawada-389230 Dist : Mahisagar (Gujarat) India

**ABSTRACT** *Physico-Chemical characteristic is based on various parameter like PH, Conductivity, Total Organic carbon, Available, Available Phosphorus (P2O5) and available Potassium (K2O).This study lead us to the conclusion of the nutrient's quantity of soil of Shehra Taluka, Dist.Panchmahals, Gujarat State. Soil sampling is the most vital step for any soil analysis. As a very small fraction of the huge soil mass is used for analysis. Results show that overage all the villages of this Shehra Taluka have various parameters like EC, PH, OC, P, K. This information will help farmers to decide the problems to said nutrients amount of fertilizers to be added to said to make the production economic.*

**INTRODUTION**

Soil sampling is perhaps the most vital is step for any soil analysis. It is a dynamic natural body developed as a result of pedogenic processes during weathering of rocks [1]. It's in traditional meaning, is the natural medium for the growth of land plants. Soil are all unconsolidated material of the earth's crust in which land plants can grow, if water and temperature are adequate atleast the minimum nutrients are available and toxic substances are in low concentration. Joffe (1949) [2] It consists of minerals and Organic constituents, exhibits definite physical, chemical and biological properties have variable depth. Over the surface of earth provides a suitable medium for plant growth. Soil mainly consists of 50% pore space ( air and water) and 50% solid phase. The soil phase is broadly composed of 45% mineral matter and 5% Organic constituents.

One of the communication deals with quality of soil of Dehegam Taluka.* Soil samples were collected from forty different villages of Dehegam Taluka.* Quality characteristics of soil such as PH, Electrical Conductivity (EC), Calcium ($Ca^{2+}$), Magnesium ($Mg^{2+}$), Bicarbonate ($HCO_3^-$), Chloride ($Cl^-$), Total organic Carbon, Available Nitrogen (N), Available Phosphorus ($P_2O_5$) and Potassium ($K_2O$) were determined as per standard methods. Results show that 20% soils are deficient in a available Potassium [3].

Soil analysis can improve crop productivity and minimize wastage of these nutrients thus minimizing impact an environmental leading to bias through optimum production. Deficiencies of primary, secondary and micronutrients have been observed in intensive cultivated areas. Several state including Andhra Pradesh, Gujarat, Haryana, Karnataka and Uttar Pradesh have made commendable progress in soil testing programme in various ways such as expansion of soil testing facilities, popularization of the programme in campaign mode, development of soil fertility maps and use of information technology in delivering soil nutrient status and appropriate recommendation to farmers. This compendium is an effort to put together existing status of soil testing facilities state wise and highlight main issues in soil testing programme compendium on soil health [4].

Another group studied soil samples of 10 different villages of tribal area surrounding Dahod. The physicochemical properties such as moisture content, specific gravity, PH measurement and estimations of $Mg^{2+}$, $Na^+$, $K^+$ and $Cl^-$, $HCO_3^-$, $PO_4^{3-}$, $NO^{3-}$ %of soil were well studied. The fertility of the soil depends on the concentration of P,K organic and inorganic materials and water. Nitrogen is required for growth of plant and is a constituent of Chlorophyll, plant protein and nucleic acid. Phosphorous is most often limiting nutrients remains present in plant nucleic acid act as energy storage. It helps in transfer of energy. Potassium is found in its mineral form and affect plants all division, carbohydrate formation, translocation of Sugar, various enzyme action and resistance to certain plant disease, over 60 enzymes are known to require potassium for activation. Amount of nutrients to be added to soil for crop production depend on their present amount in that soil. Fertilizer addition is recommended, now a day an STR ( Soil Test Recommendation ) basis in which contents of major nutrients (P, K) are determined following standard methods before sowing. Their values suggest quality of soil in terms of its nutrients contents i.e. high, medium, or low nutrients. These nutrients contents are than deduced from required amount of nutrients for following crop and this much amount of nutrients is now recommended for addition to soil [5,6]. One of the communication deals with quality of soil of Kalol and Godhra Taluka soil samples were collected from Nineteen different villages of Godhra, Kalol taluka. Physico Chemical study of soil is based on various parameter like PH, Conductivity, Total organic carbon. Available Nitrogen (N), Available Phosphorus ($P_2O_5$) and Potassium ($K_2O$) were determined as per standard methods. Results show that for available phosphorus of soil of the Godhra and Kalol Taluka with their fertility index [7].

There is no intent with this system to make any interpretation as to the potential environment impact of sensitive nutrients, such as phosphorus. This interpretation system is meant strictly for the determination of current soil suitability for agronomic or horticulture crop production. While nutrient availability can be important in the potential for adverse environment effects, it is only one factor in the overall picture. Slope, ground cover, incorporation of nutrient sources, timing of application and other considerations all affect the potential movement of nutrients off-site and their potential for adverse environment impact on surface and ground water [8,9]. In cold climate, rapid root development early in the season is important. To encourage this, a small amount of starter fertilizer may be recom-

Volume : 5 | Issue : 9 | September 2015 | ISSN - 2249-555X

mended for some crops even though the available level in the soil may be rated optimum or even excessive. This applies primarily to phosphate ($P_2O_5$) recommendations, since on adequate available P level is critical in promoting early root growth. Starter fertilizer nutrient quantity is typically less than normal crop removal. Soil fertility testing is really the combination of three discrete but interrelated processes: analysis, interpretation, and recommendation [10]. Stefanic's definition [11] approaches the most the fundamental biologic feature of soil fertility. Fertility is the fundamental feature of the soil that results from the vital activity of micro- population of plant roots of accumulated enzymes and chemical processes, generators of biomass, humus, mineral salts and active biologic substance. The fertility level is related with the potential level of bioaccumulation and mineralization processes, these depending on the programme and conditions of the ecological subsystem evolution and on anthropic influences. This definition has the quality to be analytical. Understanding the definition in detail, the analyses of soil samples can be used for quantifying the level of soil fertility.

Phosphate ($P_2O_5$) Requirement for different crops is calculated by the equation [12] $P_2O_5$ requirement = crop removal + (50- no.PX's) x multiplier = pounds per acre.

The number of PX's is taken from the phosphorus bar graph, which is derived from the pounds per acre Phosphorus test level. Phosphate requirement are also rounded to the nearest 10 pounds per acre. Minimum and maximum limits are also imposed, as with potash requirement. Crop removal values are different for each crop. The multiplier is derived from two factors : (1) The conversion from elemental phosphorus (P) to fertilizer phosphate ($P_2O_5$) - [ roughly a factor of 2] and (2). The average efficiency or effectiveness of added phosphate for each crop. Efficiency is the percentage of fertilizer applied which is actually taken up or which remains plants available in the soil. Phosphate efficiency is a function of several factors including soil PH, soil organic matter level, whether the fertilizer is banded or broadcast, and how thoroughly the crop rooting system exploits the plow layer.

Present study is an attempt to find out Analysis of Soil Quality Using Physico-Chemical Parameters of Shehra Taluka. The nutrient's quantity in soil of farmland in Shehra Taluka Dist: Panchmahals, Gujarat State. This information will help farmers to decide the amount of fertilizer to be added in soil to make the production economic. The objective of this paper was to analyze the trend in PH,EC,OC, P,K status of soils of farmland in Shehra Taluka Dist: Panchmahals, Gujarat State.

## EXPERIMENTAL
## MATERIALS AND METHODS

The quality test survey of the soil was conducted in 2014-15 Seventeen Villages from Shehra Taluka covering North, South, East and West, were selected for this study. A representative soil sample collected from each village which represent soils of 4 to 10 farm's depending upon area of village. Representative soil samples were collected following standard quadric procedure and taken in polythene bags. In laboratory these samples were analyzed for different chemical parameters following standard methods [13]. AR grade reagents and double distilled water were used for soil analysis. Result were compared with standard values [14] to find out low, medium or high nutrients content essential for STR.

### PHYSICO- CHEMICAL ANALYSIS

The collect samples were analyzed for major Physical and Chemical Soil quality parameters like PH, Electrical Conductivity (EC), Organic Carbon(OC) [15,16]. Organic matter is oxidized with chromic acid (Potassium Dichromate, + $H_2SO_4$). This method is widely used in Indian Laboratories. The K and P analysis by standard method. PH was measured using PH meter (Medel No. 361), EC was measured using conductivity meter (Model No. 304), OC was measured using Colourimeter (Model No. 112), Potassium was measured using Flame Photometer (Model No. 130), Phosphorus was measured using Spectrophotometer (Model No. 166). All apparatus are Systronic make, Examination of soil done by Anand Agricultural University Gujarat.

## RESULT AND DISCUSSION

Total 17 villages soil sample of Shehra Taluka Dist : Panchmahals were collected in clean polythene bags and brought to the Laboratory it is the permissible standard according to Anand Agricultural University. Air dry the soil samples in shade, crush the soil clods lightly and pass the entire quantity through 2mm stainless steel sieve, if the gravel content is substantial record as percent of the sample (w/w) as to pass it through 0.2 to 0.5mm sieves processing of the sample for analysis.

### DETERMINATION OF SOIL

**Soil temperature :-**

Soil temperature is one of the most important soil properties which influences the chemical, bio-chemical characteristics of soil

**pH :-**

pH was alkaline values ranges from 7.10 to 7.90. The maximum pH value 7.90 was recorded **Vanta Vachhoda** village (Table No.1) The limit of pH value for soil Acidic <6.5,normal 6.5-7.8, Alkaline 7.8-8.5, Alkali > 8.5.

**EC :-**

Total soluble are estimated from electrical conductivity (EC) of aqueous soil extracts. Standard value of EC in soil normal < 0.8 $dsm^{-1}$, critical for salt sensitive crops, critical for salt tolerant crops 1.6 -2.5 $dsm^{-1}$,. Injurious to most crops > 2.5 $dsm^{-1}$. The EC value 0.4 to 1.8 (table no.1)

**OC**

Soil organic carbon is the seat of nitrogen in soil and its determination is often carried out as an index of nitrogen available, In the colorimeter method (Datta et al 1962), Organic matter is oxidized with chromic acid. OC in Shehra Taluka 0.23 to 0.85 (table no.1). Standard value of OC low< 0.50, medium 0.50-0.75 and high > 0.75.

**Phosphorus :-**

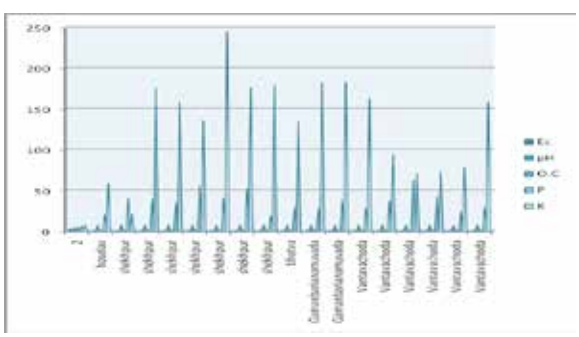
Phosphorus was found in the range of low, medium, high (table no.1). Inorganic phosphorus as orthophosphate plays a dynamic role in aquatic ecosystem. Phosphorus, the most important micro nutrient is utilized by plant in the form of $H_2PO_4^-$ & $HPO_4^{2}$ – species.

**Potassium :-**

Standard value of K as $K_2O$ in soil low < 140 kg $K_2O$ $ha^{-1}$, medium 140-280 kg $K_2O$ $ha^{-1}$ high > 280 kg K2O ha-1. Potassium was found in the range of low, medium, high (table No.1). K though present in small amount in soil sample, plays a vital role in the metabolism of fresh water and considered to be an important micronutrient. The K is relatively abundant in the earth's crust, most of it is not accessible to plant.

Volume : 5 | Issue : 9 | September 2015 | ISSN - 2249-555X

| No. | Name of village | Ec | pH | O.C | P | K |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | hoselav | 0.46 | 7.25 | 0.03 | 20 | 58 |
| 2 | shekhpur | 0.23 | 7.30 | 0.02 | 41 | 21 |
| 3 | shekhpur | 0.21 | 7.10 | 0.03 | 39 | 176 |
| 4 | shekhpur | 0.39 | 7.55 | 0.02 | 36 | 158 |
| 5 | shekhpur | 0.44 | 7.40 | 0.03 | 56 | 136 |
| 6 | shekhpur | 0.43 | 7.10 | 0.03 | 40 | 245 |
| 7 | shekhpur | 0.35 | 7.15 | 0.03 | 52 | 176 |
| 8 | shekhpur | 0.42 | 7.24 | 0.04 | 19 | 179 |
| 9 | bhotva | 0.29 | 7.06 | 0.04 | 29 | 135 |
| 10 | Gamanbarianamu-vada | 0.35 | 7.20 | 0.04 | 28 | 182 |
| 11 | Gamanbarianamu-vada | 0.30 | 7.30 | 0.03 | 38 | 183 |
| 12 | Vantavachoda | 0.37 | 7.30 | 0.06 | 28 | 162 |
| 13 | Vantavachoda | 0.53 | 7.30 | 0.03 | 37 | 94 |
| 14 | Vantavachoda | 0.54 | 7.30 | 0.03 | 63 | 71 |
| 15 | Vantavachoda | 0.51 | 7.38 | 0.04 | 43 | 73 |
| 16 | Vantavachoda | 0.98 | 7.30 | 0.02 | 24 | 78 |
| 17 | Vantavachoda | 1.02 | 7.90 | 0.04 | 29 | 158 |




## CONCLUSION

This can be concluded from this study that the available EC, pH, OC, N, P, K deficient soil is recommended rich fertilizer. To predict the probable crop response to applied nutrients. To identify the type and degree of soil related problems like salinity, alkalinity and acidity etc. and to suggest appropriate reclamation / amelioration measure. To find out suitability for growing crops and orchard. To find out suitability for irrigation. To study the soil genesis.

**Acknowledgement**

Thanks to Teaching & Non-teaching staff, Department of Chemistry, M.P.Pandya Science College, Lunawada Dist : Mahisagr (Gujarat) of their suggestions and co-operation during the present work.We are also thankful to the Coordinator of soil project, Government of Gujarat

**REFERENCE**

P.K.Gupta, Methods in Environmental analysis, 2nd Edition Agrobios, Kota, India 101,(2000). | [2] H.Kaur, Environmental Chemistry 2nd Edition, Pragati Prakashan 416,(2002). | [3] Mayur Shah, Pratek Shilpkar, Ajay Shah, Amit Isadara and Anilsinh Vaghela, J Dev.Adv, Res.2(1), 50-53, (2011). | [4] R.Rawds,Earth is first Organics, Chemical Engineering News, Compendium on Soil health Report American Chemical Society, 20-22, (1997). | [5] R.W.Miller and R.L.Donahue, Soils in our Environment 7th edition Prentice Hall Ine, New Jersey-07362, 67-68., (1995). | [6] B. S. Patel and H.R.Dabhi, Asia Journal of chemistry, 12(2), 1155-1158, (2009). | [7] Dilip.H.Patel and Milan M.L., Archives of Applied Science Research 5(4) : 24-29, (2013). | [8] J. L. Lemunyon and R.G. Gilber, Journal of Production Agriculture, 6[4]:483-486, (1993). | [9] D.Beegle, Interpretation of Soil Testing Result, IN Recommended Soil Testing Procedures for the Northeastern United State. University of Delaware Ag. Experiment Station Bulletin no.493, second edition UK, 84-91, (1995). | [10] D. J. Eckert, Soil test interpretations: Basic cation saturatin ratios and sufficiency levels,IN Soil testing Sampling, correlation, calibration, and interpretation. J.R. Brown editor, SSSA Special Publication No.21. Soil Science Society of America.,53-64. (1987). | [11] G. Stefanic, Biological definition quantifying method and agricultural interpretation of soil fertility, Romanian Agricultural Research 2, 107-116, (1994). | [12] B. R. Hoskins, Soil testing handbook for professionals in agriculture, horticulture, nutrient and residuals management. Third edition. Formely "Soil Testing Handbook for professional Agriculturalists", Phosphate requirements. Maine Soil Testing Service / Analytical Lab Maine Forestry & Agricultural Experiment Station University of Maine 34-35, (1997). | [13] M. L. Jakson , Soil Chemical analysis, Prentice-Hall of India Pvt. Ltd., New Delhi.,123-126, (1967). | [14] S.R. Olsen, C.V.Cole, F.S.Watanbe, L.A.Dean. Estimation of available phosphorus in soils by extraction with sodium bicarbonate. USDA Circular No. 939. (1954). | [15] S. R. Olsen and L E Sommers, Phosphorus- IN Methods of Soil Analysis, Agronomy no.9, part 2,second edition. American Society of Agronomy.,416-422, (1982). | [16] www.ifc.org | |