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Physico-Chemical Characterization of farmland Soil used in some villages of Lunawada Taluka. Dist : Mahisagar (Gujarat) India

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***Abstract*-** This Physco-Chemical study of soil is based on various parameter like PH, Electrical Conductivity(EC),Total Organic Carbon, Available Nitrogen (N), Available Phosphorus (P_2O_5) and available Potassium (K_2O). This study lead us to the conclusion of the nutrient's quanity of soil of Lunawada Taluka. Dist. Mahisagr, 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. It becomes extremely important to get a truly representative soil sample of the field. Result show that overage all the villages of Lunawada taluka have various parameter like EC, PH, OC,N,P,K. This information will help farmers to decide the problems related to soil nutrients amount of fertilizers to be added to soil to make production economic.

***Index Terms*-** Quality of soil, EC, PH,Total organik carban, Available P, N,K, Lunawada taluka

I. INTRODUCTION

Soil sampling is perhaps the most vital step for any soil analysis. As a very small fraction of the huge soil mass is used for analysis, it becomes extremely important to get a truly representative soil sample of the field. Soil test based nutrient management has emerged as a key issue in efforts to increase agricultural productivity and production since optimal use of nutrients, based on soil analysis can improve crop productivity and minimize wastage of these nutrients, thus minimizing impact on environmental leading to bias through optimal production. Deficiencies of primary, secondary and micronutrients have been observed in intensive cultivated areas.[1]

Several state including Andhra Pradesh, Gujarat, Haryana, Karnataka and Uttar Pradesh have made commendable progress in soil testing programme in various ways. . This compendium is and effort to put together existing status of soil testing facilities state wise and highlight main issues in soil testing programme compendium on soil health [2]. Soil is important everyone either directly or indirectly. It is natural body on which agricultural product grow and it has fragile ecosystem [3,4]. Soil are medium in which crop grow to food and cloth the world. Soil fertility vital to a productive soil. Certain external factors control plant growth, air, temperature, light mechanical support, nutrients and water. Plants had elements for their growth and completion of life cycle. They are carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, etc [5].

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 N,P,K organic and inorganic materials and water. Nitrogen is required for growth of plant and is a constituent of Chlorophyll, plant protein and nuclei acid. Phosphorous is most often limiting nutrients remains present in plant nuclei and 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 (N, 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 content are than deduced from required amount of nutrients for following crop and this much amount of nutrients is now recommended for addition to soil [6,7].

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 gauging 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 recommended 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 form the phosphorus bar graph, which is derived form the pounds per acre P 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. See individual crop sections for assumed efficiency and crop removal factors.

Present study is an attempt to find out the nutrient's quantity in soil Lunawada taluka Mahisagr, Gujarat. This information will help farmers to decide the amount of fertilizer to be added to soil to make the production economic. The objective of this paper was to analyze the trend in PH, EC,OC, N,P, K status of soils of Lunawada taluka of Gujarat State.

II. Experimental

The quality test survey of the soil was conducted in 2013. Fifteen villages from Lunawada Taluka covering North, South, East and West were selected for this study. A representative soil sample collected from each village which represent soils of 5 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. Results were compared with standard values [14] to find out low, medium or high nutrient's content essential for STR.

III. Physico - Chemical Analysis

The collected samples were analyzed for major Physical and Chemical soil quality parameter like PH, Electrical Conductivity (EC), Organic Carbon (OC), Nitrogen (N), [15,16]. Organic matter is oxidized with chromic acid (Potassium Di-chromate, + 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(Model no. 361), EC was measured using a 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.

IV. Result and Discussion

Total 15 villages soil samples of Lunawada Taluka, Dist : Mahisagar 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 grind with the help of pestle and mortar, pass the entire quantity through 2mm stainless steal sieve, if the gravel content is substantial record as percent of the sample (w/w) as to pass it through 0.2 to 0.5 mm sieves, processing of the samples for analysis.

V. Determination of Soil

(1) Soil Temperature :-

Soil temperature is one of the most important soil properties that effect crop growth. The major source of heat is sun and heat generated by the chemical and biological activity of the soil is negligible.

(2) PH :-

The soil reaction or PH is meant to express the acidity or alkalinity of the soil. The PH is very important property of the soil is it determines the capacity. The PH values fluctuated less than 8.5(table-1) .The limit of PH value for soil Acidic. < 6.5, Normal 6.5-7.8, Alkaline 7.8- 8.5, Alkali > 8.5.

(3) EC :-

Total soluble salts 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 04 to 1.8 (table no.1)

(4) OC and Nitrogen(N) :-

Soil organic carbon is the seat of nitrogen in soil and its determination is often carried out as an index of nitrogen availability. In the colorimeter method (Datta et al, 1962), Organic matter is oxidized with chromic acid. OC in Lunawada 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.

(5) 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.

(6) 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}

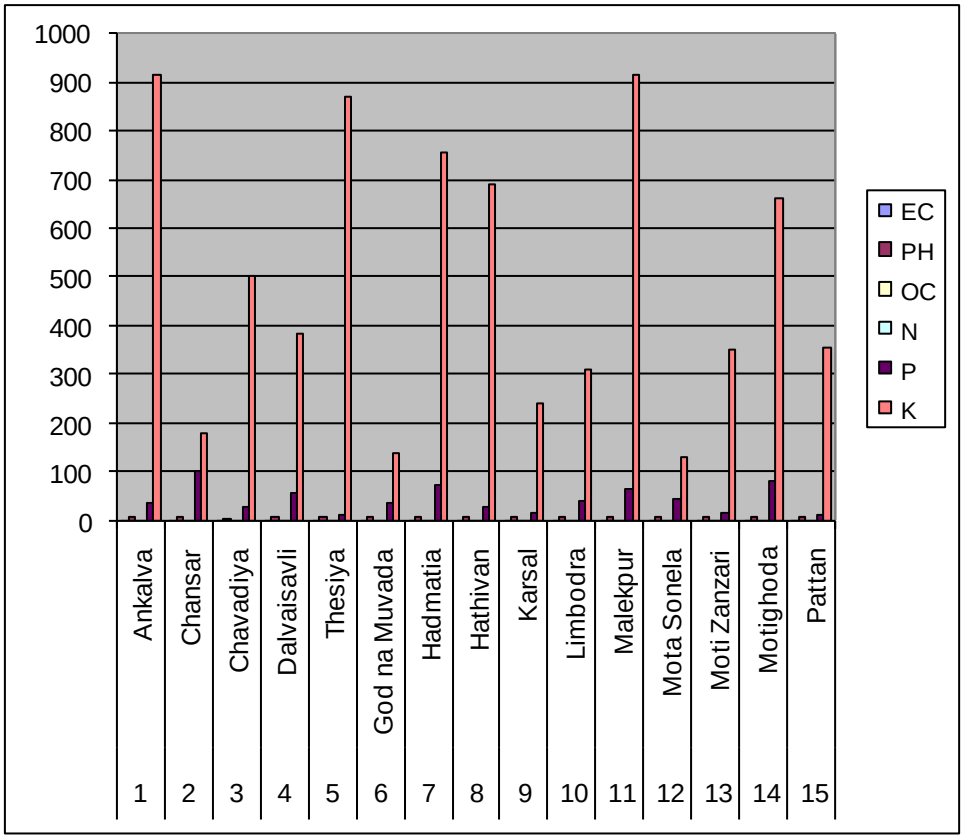
high > 280 kg K_2O ha^{-1} . Potassium was found in the range of low, medium , high (table no.1). K though present in small amount in soil sample, plays a vital role in the metabolism of fresh water and considered to be an important micronutrient. The K is relatively abundant in the earth's crust, most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

Experimental value of quality characteristic especially PH, EC, OC, N, P, K, of soil of Lunawada Taluka are present in the table no. 1. Result are in tune with farming practices followed by farmers of this region. Most of the farmer's are using chemical fertilizer, Urea and Nitrogen fertilizer only since last 25 to 30 years which contains concentrated amount of Nitrogen, OC & Phosphorus. On the basis of these results farmers are advised to use integrated nutrient management practice to maintain optimum concentration of all the essential nutrients for plants. Farmers are also advised to add bio-fertilizers containing organic carbon and nitrogen solubilising bacteria.

Table 1 : Study of Presence of EC, PH, OC, N, P, K, in the soil of Lunawada taluka territory District : Mahisagar

Sr.No.	Name of Villages	EC	PH	OC	N	P	K
1	Ankalva	0.5	7.1	0.5	0.04	37	914
2	Chansar	0.2	7.1	0.8	0.07	100	178
3	Chavadiya	1.3	6.1	0.5	0.04	30	503
4	Dalvaisavli	0.5	7.5	0.7	0.06	57	383
5	Thesiya	0.5	6.9	0.7	0.06	12	868
6	God na Muvada	0.3	6.5	0.5	0.04	38	137
7	Hadmatia	0.7	7.8	0.4	0.03	74	754
8	Hathivan	0.8	6.9	0.5	0.04	27	690
9	Karsal	0.7	6.9	0.5	0.04	16	242
10	Limbodra	0.4	7.8	0.5	0.04	42	310
11	Malekpur	0.6	7	0.7	0.05	66	914
12	Mota Sonela	0.4	6.8	0.8	0.06	46	132
13	Moti Zanzari	0.4	7	0.6	0.05	15	352
14	Motighoda	0.3	6.7	0.6	0.05	80	663
15	Pattan	0.4	6.9	0.3	0.03	13	355

Figure 1 : Number of samples of 15 villages Lunawada taluka lies in EC, PH, OC, N, P, K



VI. 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. The soil sample studied area of Lunawada Taluka. Dist : Mahisagar has been found to be fit for crop productivity.

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