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Original Research Paper

CHARACTERIZATION OF QUALITY OF FARMLAND SOIL OF SOME VILLAGES OF IDAR TALUKA OF SABARKANTHA DISTRICT OF GUJARAT – INDIA

Chemistry

KEYWORDS: : - Quality of soil, pH, EC, OC, Phosphorus, Potassium, Idar Taluka.

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ABSTRACT

We have performed Physico-Chemical study of farmland soil based on various parameters like pH, Electrical Conductivity (EC), Total Organic Carbon, Available Phosphorus (P_2O_5) and available Potassium (K_2O). Present study leads us to the conclusion of the nutrient's quality of farmland soil of Idar Taluka, Dist: Sabarkantha, Gujarat State India. Soil sampling is the most vital step for any soil analysis. It becomes extremely important to get a truly representative soil sample of the field. This is because a very small fraction of the huge soil mass is used for analysis. As the present study includes various parameters like EC, PH, OC, P and K, it helps farmers to decide the problems related to soil nutrients and amount of fertilizers to feed in order to achieve increase yield of crop.

INTRODUCTION

Soil is one of the most important resources of the nature. All living things depend on plants, and plants grow in soil for day to day need. Soils are medium in which crops grow to food and cloth. Soil is not only important for agriculture but also have more useful for living organisms. Soil as a component of the terrestrial ecosystem fulfills many function including those that are essential for sustaining plant growth [1]. Any parts of earth surface that support vegetation also bears a covering of soil. Vegetation distribution and development largely depends on the soil condition [2]. Soil sampling is perhaps the most vital step for any soil analysis. As a very small fraction of the soil is used for analysis, routine Soil tests measure only a bit of the total lake of nutrients in the soil [3]. Soil mainly consists of 50% pore space (air and water) and 50% solid phase. The solid phase is broadly composed of 45% mineral matter and 5% organic constituents [4,5].

Available Potassium and Fertility Index of farmland soil of Danta taluka was recently reported from our laboratory. Total 3180 samples from Thirty Four villages of Danta taluka was selected for the study [6]. Literature reveals that Physico-chemical study of soil is found significant importance in the farming practice. Soils have large amounts of plant essential nutrients but only small fractions are in the form that can be taken up directly by plants. Soil analysis can improve crop productivity and minimize wastage of these nutrients. Deficiencies of primary, secondary and micronutrients have been observed in intensive cultivated areas [7]. The study of interested parameters for various area was reported [8,9,10,11].

Current study is an effort to discover out the nutrient's quantity in soil of Idar Taluka, District- Sabarkantha Gujarat. This information will help farmers to make a decision for crucial requirement of fertilizer to be feed in soil to make the production economic. The objective of this paper was to evaluate the trend in pH, EC, OC, P, K status of soils of Idar Taluka, District- Sabarkantha Gujarat.

MATERIALS AND METHODS

The soil analysis data is the best source available to assess soil fertility status. All 17 villages from Idar Taluka covering East, West, North and South were selected for this study. A representative soil samples was 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 [18]. AR grade reagents and double distilled water were used for soil analysis. Results were compared with standard values [11] to find out low, medium or high nutrient's content essential for STR.

The collected soil samples were analyzed for major quality parameter like pH, Electrical Conductivity (EC), Organic Carbon (OC), Potassium (K) and Phosphorus (P). Organic matter is oxidized with chromic acid (Potassium Di-chromate + H_2SO_4). This colorimetric method [13,14] is widely used in Indian Laboratories. pH was measured using pH meter, EC was measured using a conductivity meter, OC and Phosphorus were measured using calorimeter, Potassium was measured using Flame photometer.

(1) Soil Temperature: Soil temperature is one of the most important soil properties that affect crop growth. The major source of temperature is sun and heat generated by means chemical and biological activity of the soil is negligible.

(2) pH: Soil pH is an important measurement to assess potential availability of beneficial nutrients and toxic elements to plants. The soil reaction or pH is the way to express the acidity or alkalinity of the soil. Increased dilution of a soil/water mixture causes an increase in soil pH [15]. The observed values were found in the range of 7.13 to 8.16 (Table-1).

(3) EC: Total soluble salts present in soil are estimated from electrical conductivity (EC) of aqueous soil extracts (1 part of soil: 2 part of deionized water). Standard value of EC in soil- Normal < 2 ds/cm, critical for salt sensitive crops, critical for salt tolerant crops 2 - 8 ds/cm, Injurious to most crops > 2.5 ds/cm. The EC value 0.23 to 1.24 ds/cm (Table no.1).

Table 1: Soil Characteristic data for 5864 samples from selected villages of Idar taluka, District - Sabarkantha

Sr.No.	Sample Site	No. of Samples	PH	EC	OC	P	K
1	Acharal	92	7.79	1.24	0.81	26.85	182.23
2	Badarpur	94	8.11	0.30	0.53	42.48	248.93
3	Khaski	119	8.16	0.23	0.49	40.89	283.05
4	Pratappura	142	7.96	0.74	0.89	50.32	231.21
5	Daramali	218	7.97	0.63	0.48	36.40	284.36
6	Sarangpur	183	7.51	1.03	0.63	61.43	293.70
7	Verabar	313	8.04	1.10	0.65	34.70	280.58
8	Ravol	232	7.93	0.35	0.57	52.95	283.63
9	Lei	300	7.95	0.72	0.79	39.61	259.97
10	Umedpura	409	7.13	0.33	0.63	38.17	295.75
11	Oda	451	7.94	0.41	0.39	34.03	310.85
12	Finchod	459	7.93	0.33	0.45	35.33	269.64
13	Bhadresar	420	7.81	0.40	0.54	44.33	292.79
14	Golwada	466	8.11	0.58	0.79	43.95	237.95
15	Chandap	482	7.98	0.54	0.88	54.78	250.89
16	Sabalvad	571	7.99	0.82	0.98	49.24	245.70
17	Davad	913	7.46	0.36	0.74	36.10	315.60
Mean Value		7.87	0.59	0.66	42.44		268.64

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Maximum Value	8.16	1.24	0.98	61.43	315.60
Minimum Value	7.13	0.23	0.39	26.85	182.23

(4) Organic Carbon :- 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 [13], Organic matter is oxidized with chromic acid. In the present study, OC values fall in the range 0.39 to 0.98 (Table no.1).

(5) Phosphorus: Phosphorus is one of the important nutrient and is utilized by plant in the form of $H_2PO_4^-$ & HPO_4^{2-} species. Colorimetric method was employed for the determination of Phosphorus. Inorganic phosphorus as orthophosphate plays a dynamic role in aquatic ecosystem. Phosphorus was found in the range of 26.85 to 61.43 (Table no.1).

(6) Potassium: Flame Photometric Method was employed for the determination of available Potassium in terms of K_2O in soil samples. It was found in the range of 182.23 to 315.60 as depicted in Table 1.

Para-meters	Interpretation		No. of Sample	Percentage
pH	<6.5	Acidic	0	0
	6.5 to 8.2	Neutral	5864	100
	>8.2	Basic	0	0
EC dS/cm	<1	Normal	5276	89.97
	1 to 3	Harmful	588	10.03
	>3	Very Harmful	0	0
OC (%)	<0.25	Very low	0	0
	0.26 to 0.50	Low	1247	21.27
	0.51 to 0.75	Medium	2564	43.72
	0.76 to 1.25	High	2053	35.01
	>1.26	Very High	0	0
P Kg/ha	<10	Very low	0	0
	11 to 25	Low	0	0
	26 to 60	Medium	5681	96.88
	61 to 70	High	183	3.12
	>70	Very high	0	0
K Kg/ha	<75	Very low	0	0
	76 to 150	Low	0	0
	151 to 300	Medium	4500	76.74
	301 to 450	High	1364	23.26
	>450	Very high	0	0

Table 2: Interpretation of soil properties

RESULT AND DISCUSSION:

Table 1 and 2 show the analytical results of total 5864 samples from 17 villages of Sabarkantha District. pH values were found in the range of 7.13 to 8.16. It shows that interested area of study is neutral in pH. Electrical Conductivity was found normal in almost 90% samples selected for the present study. Remaining 10% of the samples were observed in the harmful region. Particularly Acharal, Sarangpur and Verabar are the villages that showed high EC value. Organic Carbon in the soil is often known as seat of nitrogen. Tables 2 depict the values of OC which was fallen in low to high range. From the result shown in Table 1, Khaski, Daramali, Oda and Finchod were found in the OC deficient region. All other villages were in moderate or high OC content. Phosphorus is very important nutrient for plant growth. It was observed in medium range as shown in table 2. Potassium content was also found in the medium to high range as depicted in table 2.

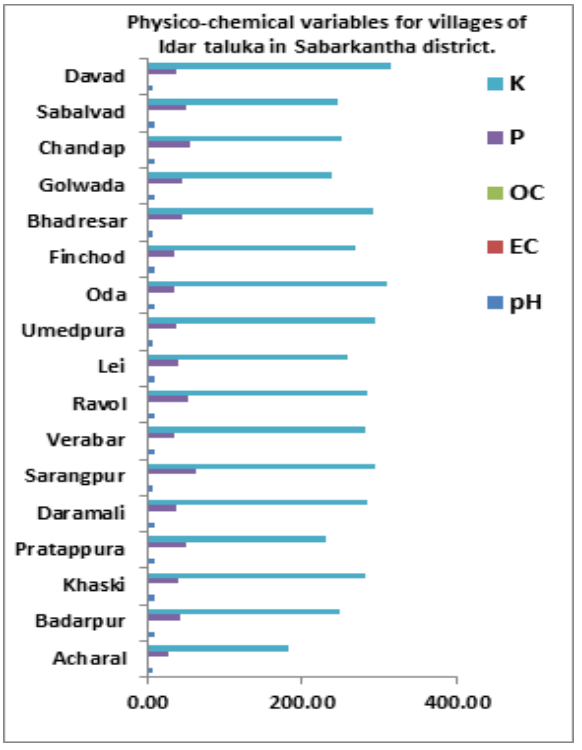

Figure 1: Physico-chemical variables for villages of Idar taluka in Sabarkantha district.

CONCLUSION

It can be concluded from this study that fertilizer recommendation was depended on the value of pH, EC, OC, P and K. Thus fertility status of soil is evaluated from this study for making fertilizer recommendations. Prediction of the probable crop response to applied nutrients is possible. By identification of the type and degree of soil related problems like salinity, alkalinity and acidity etc. It is also accomplished how to find out aptness for growing crops and orchard. Study the soil genesis and suitability for irrigation could be easier with this conclusion.

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