



STUDY OF NUTRIENTS OF AGRICULTURAL SOIL OF SAMI TALUKA IN PATAN DISTRICT

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ABSTRACT:

In this research paper quantitative analysis of some soil samples were investigated. Five representative locations were selected for the study and 20 samples from each location and direction of area were collected. Physico-chemical study of soil is based on various parameters like pH, electrical conductivity, calcium, magnesium, sulphur, organic carbon, potash, phosphorous, copper, iron, manganese and zinc. Low, medium & high range of above parameter also calculated from analysis data. This knowledge will help to the people who are interested to work in agricultural field.

KEYWORDS: Quantitative analysis, pH, Electrical conductivity, Organic carbon.

INTRODUCTION:

Soil bulk density measurements are often required as an input parameter for models that predict soil processes. Such models often use bulk density measurements to account for horizon mass when aggregating soil data. Methods to measure bulk density are labor intensive and time-consuming. Thus, models have been developed to predict bulk density from soil physical and chemical data [1 - 2].

Agricultural sustainability depends on productive soil. During the last several decades, much research has focused on increasing productivity and protecting environmental quality under different farming systems. These studies show that conventional farming's use of chemical fertilizers and pesticides has increased crop yields and enhanced food security around the globe [3]. However, despite the high yields associated with it, conventional farming's ability to sustain soil fertility and environmental quality has been called into question [3]. Conventional farming systems are reported to be associated with a decline in soil structure and soil aggregation, a decrease in water infiltration and an increase in soil bulk density, soil salinity, nitrogen leaching and ground water contamination.

Soil's physical and chemical properties can be used as indicators for making soil - quality assessments and for determining the sustainability of farming systems. Several minimum data sets have been proposed to quantitatively assess sustainability of a soil management practice. To determine a farming system's sustainability, criteria can be used that are based on the critical limits of key soil properties in relation to the threshold values

beyond which productivity declines severely or environmental impact is drastic [4]. It is important to establish critical SQI levels, assign a weighting factor, and relate them to productivity.

The objective of this publication is to review existing soil fertility research for cotton on Coastal Plain soils and to establish soil test calibration and nutrient recommendations for optimum production. A similar publication was produced for peanuts on Coastal Plain soils [5]. Much of the traditional soil fertility research with cotton today may not be published in refereed journals. This bulletin will report relevant research and extension demonstration results. This bulletin may be used by both public and private soil test laboratories and crop advisors to establish a research-based, region-wide basis for soil test interpretations and recommendations obtained the relation of soil bulk density with soil particle size distribution and organic matter content. R. Laiho [6], studied the relationships between soil bulk density and some soil properties explained that these constants can be estimated by means of regression models. Organic carbon influences many soil characteristics including colour, nutrient holding capacity, nutrient turnover and stability, which in turn influence water relations, aeration and workability.

CHEMICAL & EQUIPMENTS

Potassium chloride, Buffer tablate, Sulphuric acid, Potassium dichromate, Sodium bicarbonate, activated charcoal (phosphorous free), Ammonium molybdate, Stannous chloride, Ammonium acetate, Calcium chloride, Glacial acetic acid, Barium chloride, Gum acacia, Sodium diethyl dithiocarbamate, Sodium hydroxide, Muroxide, Ethylene di amine tetraacetate, Ammonia buffer, Diethylenetriamine pentaacetic acid, Eriochrome black-T, were procured from s.d. fine chem Ltd. All chemicals are of analytical grade reagent.

pH was measured on pH meter (systronics Model No-335), Conductivity was measured on conductivity meter (systronics Model No-304), Optical density was measured on colorimeter (systronics Model No-202), Analytical balance (Wensar Model No-PGB200) was used to weigh samples and reagents, Flame photometer (systronics Model No-128) was used for analysis of Potash, Micro Nutrients was analyzed on Double beam atomic absorption spectrophotometer (Elico Model No-SL 194).

METHOD OF ANALYSIS:-

(1) Electrical Conductivity (E.C.)

10 g soil and 20 ml distilled water were taken in 50 ml beaker. It was stirred for 30 minutes. The temperature of E.C. meter was adjusted at 25 °C then conductance was adjusted to 1.412 mS/cm by using 0.01 N KCl solution. Washed the electrode with distilled water and cleaned with filter paper. Immerses electrode in above suspense solution and note the reading.

(2) Magnesium

5 g air dried soil sample was taken in conical flask. To this, 25 ml of neutral ammonium acetate solution was added. The solution was shaken on mechanical shaker and filtered

through Whatman (No.1) filter paper. 5 ml solution was pipetted out in conical flask. To this solution, 2-3 crystal sodium diethyl dithiocarbamate, 5 ml of ammonium chloride-ammonium hydroxide buffer solution and 3-4 drops of Eriochrome black-T indicator were added. Titrated it slowly against 0.01 M EDTA solution. At the end point color changed from wine red to blue.

(3) Micronutrients (Cu, Fe, Mn, Zn) analysis by AAS

Preparation of D.T.P.A extracting solution

1.967 g D.T.P.A. and 13.3 ml triethanol amine were taken in 500 ml flask. 400 ml distilled water was added. 1.47 g calcium chloride dihydrate was taken in 1ltr flask and dissolved in 400 ml distilled water. To this solution, previously prepared D.T.P.A. & T.E.A. solution was added and pH was adjusted to 7.3 by using add 1M HCl. Make up 1 ltr with distilled water.

Analysis method for micronutrients (Cu, Fe, Mn, Zn)

Weighted 20 g dried soil sample in a plastic bottle, then added 40 ml of D.P.T.A. solution. Shake on mechanical shaker for 2 hrs. Filtered it on whatman filter No. 40 in funnel cum test tube. Prepared standard curve for element by using different working ppm solution as per standard method of analysis and condition suggested by Elico brochure and then run the sample and note the ppm of elements. Obtained ppm reading multiplied with factor 2.0.

(4) pH

In 50 ml beaker taken 10 gm soil) and added 20 ml distilled water and stir for 30 min. Adjusted the temperature of pH meter at 25 °C, Calibrated the pH meter using 4, 7.0, 9.2 pH buffer solution. Washed the electrode by distilled water and clean by filter paper. Immersed electrode in above suspension solution and note the reading.

(5) Phosphorus

Method for making standard graph for phosphorus.

0.439 g previously dried potassium dihydrogen orthophosphate was dissolved in 500 ml distilled water and 25 ml 7.0 N Sulphuric acid solution was added and then makes up 1 Ltr by using distilled water. 10 ml above solution was taken and makes up 500 ml by using distilled water (1 ml this resulting solution is equivalent to 2 ppm of phosphorus). By using this solution, various standard phosphorus ppm solutions were prepared and measured and their optical densities (O.D) were measured by using red filter.

Standard Graph of Phosphorous

Flask No	2 ppm Working Solution of Phosphorous	8.5 pH Solution of Sodium Bicarbonate	1.5 Percentage Solution of Ammonium Molybdate-HCl	Working Solution of Steanus Chloride	O.D.
1	0 Blank	5 ml	5 ml	1 ml	0
2	1 ml = 2 ppm	5 ml	5 ml	1 ml	20
3	2 ml = 4 ppm	5 ml	5 ml	1 ml	35
4	3 ml = 6 ppm	5 ml	5 ml	1 ml	54
5	4 ml = 8 ppm	5 ml	5 ml	1 ml	82
6	5 ml = 10 ppm	5 ml	5 ml	1 ml	103
7	10 ml = 20 ppm	5 ml	5 ml	1 ml	197
	Total = 50 ppm				491

Calculation

1 Reading

$$\begin{aligned}
 &= \text{Total Solution of ppm} / \text{Total Reading} \\
 &= 50 / 491 \\
 &= 0.102 \\
 &0.1010 \text{ Microgram P (Graph Factor)}
 \end{aligned}$$

1 Gram Soil = R X 0.1010 X 4 Microgram P/ Gram Soil

R = Colorimeter Reading of Sample 0.1010 = Graph Factor

P (Kg/ Hectare) = R X 0.1010 X 4 x 2.24 (2.24 = Factor in 'P' Hectare)

P₂O₅ Kg/ Hectare = R X 0.1010 X 4 x 2.24 X 2.29 (2.29 = Factor in 'P₂O₅' Hectare)

P₂O₅ Kg/ Hectare = R X 2.0723584

Process:

2 g soil sample and 40 ml 0.5 M sodium bicarbonate (8.5 pH) solution were taken in 100 ml beaker. To this, 1 g phosphate free activated charcoal was added and shaken on shaker for 30 minutes. The solution was filtered and pipette out 5 ml. 5ml 1.5% ammonium molybdate-hydrochloric acid solution was added to this solution. Allow to stand for 30 minutes, then 1ml 0.016 M stannous chloride solution was added & make up 25 ml using distilled water. Blank solution was prepared according to the above process without taking the soil sample. Red filter was used and zero optical density was set by using above blank solution, then put the above sample solution and note the optical density.

(6) Potassium

Method for graph factor of Potassium

Prepared following stock solution and from it make various potash ppm solutions and run in flame photometer and note down potash ppm the reading.

Flask No	Stock solution	Concentration of Pottash in 100 ml Volumetric Solution (ppm)	Reading of Flame Photometer
1	0.0ml (Blank)	-----	0
2	1.0ml	10ppm	40
3	1.5ml	15ppm	44.5
4	2.0ml	20ppm	54.5
5	2.5ml	25ppm	62.5
6	3.0ml	30ppm	75
7	4.0ml	40ppm	95
	Total	140ppm	371.5

Calculation

$$\begin{aligned}
 \text{1 Reading} &= \text{Total Solution of ppm} / \text{Total Reading} \\
 &= 140 / 371.5 \\
 &= 0.377
 \end{aligned}$$

$$\begin{aligned}
 \text{1 Gram Soil} &= R \times 0.377 \times 5 \text{ Microgram K} / \text{Gram Soil} \quad (0.377 \text{ Graph Factor}) \\
 R &= \text{Flame Photometer Reading of sample}
 \end{aligned}$$

K

$$\text{Kg/Hectare} = R \times 0.377 \times 5 \times 2.24 \quad (2.24 = \text{Factor in } \mathbf{K} \text{ Hectare})$$

K₂O

$$\begin{aligned}
 \text{Kg/Hectare} &= R \times 0.377 \times 5 \times 2.24 \times 1.20 \quad (1.20 = \text{Factor in } \mathbf{K}_2\mathbf{O} \text{ Hectare}) \\
 &= R \times 5.066
 \end{aligned}$$

Process:

5 g soil sample was taken in 100 ml conical flask. 25 ml 1 M neutral ammonium acetate solution was added. Shaken it for 5 minutes on shaking machine and filtered the solution on whatman filter paper. Flame photometer was calibrated by using 10, 20, 30, 40, 50, 60, 70, 80 and 90 ppm standard potassium solution. After calibration run above filtrate for analysis and note down the reading.

(7) Sulphur

Method for making standard graph for Sulphur

Weighted out 5.434 g potassium sulphate and make up 1 Ltr by using distilled water (this solution contains 1000 ppm of sulphur). 25 ml this solution was taken and make up 1 Ltr with distilled water (this is working standard solution of sulphur). Taken 0.0 (Blank), 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, and 10 ml working solution in 25 ml volumetric flask. In every flask 1.0 g barium chloride and 1 ml gum acacia solution were added, and make up 25 ml by using distilled water. Then optical density of blank solution was set to zero using blue filter.

Sr. No.	Working standard sulphur solution in ml	Ppm	O.D.
1	0	0	0
2	1	1	11
3	2	2	22
4	3	3	32
5	4	4	42
6	5	5	53
7	6	6	65
8	7	7	82
9	8	8	102
10	10	10	122
	Total ppm	46	Total: 531

Calculation:-

1 Reading = Total ppm of Sulphar/Total reading

$$1 \text{ Reading} = 46/531 \\ =0.09$$

Sulphar ppm or mg/kg

Sulphar ppm or mg/kg = sample reading X graph Factor X 50 X 25 /20 X 10

Sample Reading X 0.084871 X 50 X 25/200

Sulphar ppm = Sample Reading X 0.530443 or mg/kg

Process:

10 g air dried soil sample was taken in 150 ml conical flask. 50 ml 0.15% calcium chloride extracting solution was added and shaken on mechanical shaker for 30 min. Filtered it on whatman filter No. 42. 20 ml filtrate was taken in 25 ml volumetric flask. 2 ml glacial acetic acid, 1 g crystal of barium chloride and 1 ml gum acacia solution were added. Make up the volume to 25 ml, then first set zero optical density using blank solution (as above method without taking soil sample). Measured optical densities (O.D) of above prepared sample by using blue filter.

(8) Calcium

5 g air dried soil sample was taken in 150 ml conical flask and 25 ml of neutral normal ammonium acetate was added. Shaken it on mechanical shaker for 5 min, and filtered through Whatman filter paper No.1. 10 ml filtrate solution was taken in conical flask, and 2-3 crystals of sodium diethyl dithiocarbamate were added. Then 5 ml 16% sodium hydroxide and 40-50 mg of the murexide indicator were added. Titrate it with 0.01N EDTA solution till the color gradually changes from orange red to reddish violet (purple), note the titrated EDTA solution.

(9) Carbon

Method for making standard graph for Organic carbon.

Weighed out 1.25 g sucrose and taken it into 250 ml of volumetric flask and dissolved in 1 N of potassium dichromate solution, and makes up 250 ml volume by using 1 N potassium dichromate. 7 glass beakers of 50 ml were taken and numbered from 1 to 7. 0 ml, 1 ml, 2 ml, 3 ml, 4 ml, 5 ml and 6 ml solution was taken into above beakers from prepared solution of potassium dichromate. Taken 10 ml 1 N potassium dichromate solution and 20 ml conc. sulphuric acid in test-tube and placed for 30 minutes. Allowed to cool and added 20 ml distilled water. Prepared following different standard carbon ppm solution and measured optical density (O.D.) by using red filter.

Sr. No	ml of sucrose solution diluted in potassium dichromate	Amount of sucrose	O.D.
1	0 (blank)	-----	0
2	1	0.005 g	30
3	2	0.010 g	61
4	3	0.015 g	92
5	4	0.020 g	122
6	5	0.025 g	153
7	6	0.030 g	185
	Total	0.105 g	643

Calculation:-

1 Reading

$$\begin{aligned}
 1 \text{ Reading} &= \text{Total Amount of Sucrose} / \text{Total Reading} \\
 &= 0.000163297 \\
 &= 0.000161043 \text{ gm Sucrose}
 \end{aligned}$$

1 Reading Carbon value:

$$\begin{aligned}
 &0.00006858 \\
 &0.00006764 \text{ gram organic carbon}
 \end{aligned}$$

$$\begin{aligned}
 1 \text{ Reading Graph Factor Value} &= 0.000067638 \times 100 \\
 &= 0.0067638
 \end{aligned}$$

Process:

Taken 1.0 g soil sample in 100 ml beaker. 10 ml 1 N Potassium dichromate solution and 20 ml conc. Sulfuric acid were added to the sample and cooled the solution for 30 minutes. 20 ml distilled water was slowly added and allowed for 12 hrs for oxidation. Then first set zero optical density using blank solution (as above method without taking soil sample). Measured optical density (O.D.) of soil sample by using red filter and note down the reading.

Result and Discussion

Soil sampling

Soil sampling was done during the dry season. Soil sampling was done at five randomly located points within each farm. The soils were sampled at two depths, 0 to 15 cm,

15 to 35 cm, using mini-soil pits dug at each sampling point. The soil samples were air dried in the laboratory and sieved through a 2 mm sieve for different types of laboratory analyses.

Critical Limits of Nutrients:-

Calculation of soil fertility Index:

$$= \frac{(\% \text{ of Low} \times 1) + (\% \text{ of Medium} \times 2) + (\% \text{ of High} \times 3)}{100}$$

Sr.No	Parameters	Unit	Critical Limits		
			Low	Medium	High
1	pH	-----	<6.5	6.5-8.2	>8.2
2	Electric Conductance	-----	<1	1-3	>3
3	Organic carbon	%	<0.51	0.51-0.75	>0.75
4	Phosphorous	Kg/Hectare	<26	26-60	>60
5	Potash	Kg/Hectare	<151	151-300	>300
6	Zinc	ppm	<0.5	0.5-1.0	>1.0
7	Ferrous	ppm	<5	5-10	>10
8	Sulphur	ppm	<10	10-20	>20
9	Manganese	ppm	<5	5-10	>10
10	Copper	ppm	<0.2	0.2-0.4	>0.4
11	Magnesium	ppm	<1.0	1.0-2.0	>2.0
12	Calcium	ppm	<1.5	1.5-3.0	>3.0

Calculation of Low, Medium, High rating of soil fertility Index:

Sr. No.	Range	Rating
1	Less than 1.67	Low
2	1.67 to 2.33	Medium
3	Greater than 2.33	High

Samples site:

Village :Kathivada, Taluka: Sami, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/ Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/100 gm soil)	Ca (Me*/100 gm soil)
1	8.2	0.58	0.69	78.75	156.47	0.44	9.82	16.44	8.48	2.32	8.4	15.7
2	8	0.65	0.77	62.17	160.31	0.4	11.32	22.28	7.64	1.84	4.45	13.45
3	7.9	1	0.67	51.81	164.7	1.22	9.58	20.16	7.18	1.3	2.3	13.9
4	7.6	1.82	1.24	43.52	219.6	1.86	5.84	37.13	11.88	1.06	6.95	18.45
5	7.8	0.67	0.65	55.95	184.46	2.26	6.88	25.46	17.52	1.22	3.5	14.7
6	8.8	1.39	0.57	62.17	200.39	0.68	9.32	23.87	23.62	1.3	5.65	16.45
7	7.6	0.5	0.65	78.75	186.11	0.68	9.82	28.11	9.2	1.42	436	16.7
8	8	1	0.51	66.32	191.05	2.4	9.9	22.81	11.56	1.38	4.55	10.55
9	7.6	0.64	0.6	49.74	113.09	1.64	6.96	27.05	14.44	1.04	2.3	15
10	7.9	0.27	0.2	55.95	108.15	0.9	6.56	34.48	19.96	1.12	2.35	10.65
11	8.4	0.23	0.14	41.46	109.25	0.56	7.28	33.42	8.54	1.06	2	6.7
12	8.3	0.28	0.17	72.53	87.84	0.52	5.12	37.13	8.88	0.92	2	87.7
13	8.3	0.63	0.45	80.82	122.98	2.4	7.97	39.25	10.72	1.04	1.85	6.65
14	8.1	0.39	0.54	24.87	86.19	0.88	14.62	37.66	608	1.46	3.5	10.7
15	8.2	0.22	0.78	31.09	140	0.74	7.28	16.97	15.02	0.92	4.35	16.65
16	8.3	0.17	0.3	39.37	84.55	0.42	8.26	21.22	7.48	0.92	3.8	10.9
17	8.5	0.21	0.28	41.45	58.74	0.72	9.32	25.46	10.36	1.3	3.8	12.4
18	8.5	0.49	0.41	33.16	93.88	0.7	6.08	37.13	13.1	1.08	7.4	16.7
19	8.2	0.18	0.58	49.74	219.6	0.7	8.42	34.48	14.78	1.36	3.3	11.8
20	8	0.62	0.85	55.95	148.78	1.32	10.16	32.36	13.86	1.78	4.6	15.7

*=Miliequivalent

Soil Fertility Index & Soil Test Rating:

Samples site:

Village :Kathivada, Taluka: Sami, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/ Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/100 gm soil)	Ca (Me*/100 gm soil)
L	0	16	7	1	11	3	0	0	0	0	0	0
M	13	4	9	12	9	10	17	2	7	0	3	0
H	7	0	4	7	0	7	3	18	13	20	17	20
%L	0	80	35	5	55	15	0	0	0	0	0	0
%M	65	20	45	60	45	50	85	10	35	0	15	0
%H	35	0	20	35	0	35	15	90	65	100	85	100
S.F.I.*	2.35	1.20	1.85	2.30	1.45	2.20	2.15	2.90	2.65	3.00	2.85	3.00
LMH** of SFI	H	L	M	M	L	M	M	H	H	H	H	H

*= Soil Fertility Index, **= Low, Medium, and High Soil Fertility Index

CONCLUSION:- Above Results Indicate That E.C are Low in Amount, Should be added For Better Plant Growth and Productivity. The Other Parameters are sufficient in Limit. pH is in High Limit So it can be Neutralized by using Acidic Fertilizer Like Potassium Chloride Fertilizer.

Samples site:

Village : Rafu, Taluka: Sami, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/ Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/100 gm soil)	Ca (Me*/100 gm soil)
1	8.41	0.39	0.56	66.32	604.45	1.18	10.1	32.36	7.84	1.98	0.95	19.15
2	8.45	0.3	0.59	62.17	546.8	0.2	8.56	37.66	8.54	1.5	1.25	16.05
3	8.38	0.42	0.72	70.46	552.84	0.18	10.4	38.72	10	1.62	1.7	16.7
4	8.2	1.56	0.69	74.6	564.92	0.24	8.34	35.54	10.4	1.5	3.35	19.65
5	8.44	0.63	0.7	51.81	529.24	0.42	11.2	40.31	10.2	1.56	3.3	16
6	8.06	1	0.66	58.03	594.02	0.14	6.26	31.83	8.92	1.18	2.65	14.15
7	8.55	0.39	0.66	60.1	518.81	0.34	8.56	32.89	8.7	1.52	2.45	13.55
8	8.4	0.7	0.65	74.6	546.8	0.36	8.06	41.9	11.2	1.4	2.6	15.1
9	8.34	1.21	0.7	72.53	520.45	0.42	7.36	40.31	9.66	1.46	1.05	19.15
10	8.55	0.39	0.66	60.1	518.81	0.34	8.56	32.89	8.7	1.52	2.45	13.55
11	8.3	1.13	0.65	53.88	551.2	0.28	9.36	42.44	9.7	1.49	6	13.7
12	8.38	0.93	0.74	51.81	601.7	0.24	7	38.1	6.54	1.2	6.1	14
13	8.6	0.42	0.75	76.68	588.58	0.32	8.82	38.72	10.1	1.66	4	12.8
14	8.03	1.04	0.7	66.32	603.35	0.26	7.76	41.37	10.6	1.38	6.15	15.25
15	8.52	0.48	0.54	58.03	632.45	0.28	8.42	35.54	8.5	1.38	5.45	15.45
16	8.5	0.54	0.74	68.39	620.92	0.46	7.8	35.01	8.74	1.46	4.6	21.2
17	8.15	1.44	0.71	55.95	526.49	0.34	9.6	40.31	13.1	1.68	3.65	17.75
18	8.14	1	0.64	82.89	639.04	0.28	8.06	39.25	10.9	1.46	4.75	13.35
19	8.14	1	0.57	64.24	617.63	0.4	7.48	35.01	13	1.52	4.8	16.1
20	8.25	1.29	0.55	78.75	628.06	0.3	7.18	32.89	10.5	1.26	6.5	17.3

*=Miliequivalent

Soil Fertility Index & Soil Test Rating:

Samples site:

Village : Rafu, Taluka: Sami, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/ Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/ 100 gm soil)	Ca (Me*/ 100 gm soil)
L	0	11	0	0	0	19	0	0	0	0	1	0
M	6	9	20	6	0	0	17	0	11	0	3	0
H	14	0	0	14	20	1	3	20	9	20	16	20
%L	0	55	0	0	0	95	0	0	0	0	5	0
%M	30	45	100	30	0	0	85	0	55	0	15	0
%H	70	0	0	70	100	5	15	100	45	100	80	100
S.F.I.*	2.70	1.45	2.00	2.70	3.00	1.10	2.15	3.00	2.45	3.00	2.75	3.00
LMH** of SFI	H	L	M	H	H	L	M	H	H	H	H	H

*= Soil Fertility Index, **= Low, Medium, and High Soil Fertility Index

CONCLUSION:- Above Results Indicate That E.C & Zn are Low in Amount, Zinc Sulphate Should be added For Better Plant Growth and Productivity. The Other Parameters are sufficient in Limit. pH is in High Limit So it can be Neutralized by using Acidic Fertilizer.

Samples site:

Village : Vahedpura, Taluka: Sami, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/ Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/100 gm soil)	Ca (Me*/100 gm soil)
1	8.67	0.27	0.31	70.46	98.82	0.62	21.94	15.38	28.36	2.8	2.85	15.02
2	8.81	0.19	0.55	55.95	117.49	0.5	18.58	15.38	26.6	2.6	4.35	12.35
3	8.76	0.2	0.34	84.97	191	0.88	25.56	23.24	27.78	3	2.92	10.15
4	8.82	0.14	0.49	60.1	98	0.56	22.32	22.28	22.58	1.78	2.75	9.85
5	8.58	0.29	0.66	60.1	130.61	0.42	21.48	35.54	25.28	2.28	3.45	10.05
6	8.83	0.15	0.33	5.23	102.66	1.12	21.76	28.64	29.92	2.87	4	10.7
7	8.6	0.2	0.46	76.68	144.94	0.98	17.52	21.22	26.86	2.66	2.65	10.25
8	8.92	0.16	0.29	2.8	217.95	2.52	16.14	20.16	23.08	2.18	2.15	17.15
9	8.68	0.14	0.61	49.74	98.82	4.38	18.06	39.25	28.26	3.2	2.4	8.7
10	8.08	0.17	0.53	26.94	105.41	1.48	20.12	35.01	27.82	2.6	3.1	9
11	8.87	0.21	0.94	43.52	146.58	0.64	22.5	14.85	24.7	2.76	2.25	9.15
12	8.96	0.12	0.36	95.33	170.19	1.66	23.82	33.42	243.66	2.54	4.9	11.7
13	8.79	0.17	0.83	64.24	192.87	4.86	21.4	25.46	27.98	2.6	4.25	12.85
14	8.85	0.16	0.66	41.45	180.07	1.22	22.04	23.34	29.3	2.42	3.95	11.45
15	8.91	0.49	0.6	55.95	164.15	0.92	21.4	20.69	28.76	2.5	5.25	11.55
16	8.83	0.18	0.68	18.65	144.77	3.28	20.66	30.77	26.32	2.22	4.6	10.2
17	8.95	0.13	0.62	37.3	89.65	0.78	24.5	31.83	26.44	2.94	4.45	13.15
18	8.62	0.19	0.48	24.87	103.49	1.18	21.76	38.15	25.05	2.8	2.9	932
19	8.75	0.2	0.6	49.74	76.48	1.46	19.84	36.07	31.78	2.8	3.4	9.8
20	8.65	0.16	0.7	39.37	168.98	0.46	23.08	39.25	29.14	2.54	5.55	11.25

*=Miliequivalent

Soil Fertility Index & Soil Test Rating:

Samples site:

Village : Vahedpura, Taluka: Sami, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/ Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/100 gm soil)	Ca (Me*/100 gm soil)
L	0	20	8	4	13	2	0	0	0	0	0	0
M	1	0	10	9	7	8	0	3	0	0	0	0
H	19	0	2	7	0	10	20	17	20	20	20	20
%L	0	100	40	20	65	10	0	0	0	0	0	0
%M	5	0	50	45	35	40	0	15	0	0	0	0
%H	95	0	10	35	0	50	100	85	100	100	100	100
S.F.I.*	2.95	1.00	1.70	2.15	1.35	2.40	3.00	2.85	3.00	3.00	3.00	3.00
LMH** of SFI	H	L	M	M	L	H	H	H	H	H	H	H

*= Soil Fertility Index, **= Low, Medium, and High Soil Fertility Index

CONCLUSION:- Above Results Indicate That E.C. are Low in Amount, Should be added For Better Plant Growth and Productivity. The Other Parameters are sufficient in Limit. pH is in High Limit So it can be Neutralized by using Acidic Fertilizer Like Potassium Chloride.

Samples site:

Village :Sonar, Taluka: Sami, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/ Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/100 gm soil)	Ca (Me*/100 gm soil)
1	7.97	0.38	0.4	64.24	321.71	1.22	10.1	23.3	19.2	1.5	2.45	10.1
2	7.6	0.2	0.22	58	278.34	0.86	8.52	12.2	8.9	0.8	1.6	5.1
3	7.89	0.23	0.23	33.16	279.89	0.5	9.84	18.6	9.4	0.5	2.15	6.65
4	7.7	0.25	0.19	45.59	238.27	0.58	8.38	29.2	9.32	0.5	2.25	7.05
5	7.59	0.25	0.22	29.01	323.36	0.64	8.32	18	8.8	0.5	2.4	7.2
6	7.83	0.24	0.14	16.59	312.93	0.6	6.98	14.3	9.28	0.6	2	5.6
7	7.71	0.26	0.26	37.3	257.48	0.84	7.4	387.7	8.7	0.7	1.75	6.35
8	7.58	0.25	0.28	53.88	278.89	0.68	8.1	18	8.97	0.7	1.3	4.2
9	7.65	0.32	0.15	47.66	214.11	0.9	7.62	20.7	9.94	0.6	1.15	4.55
10	7.71	0.1	0.17	33.16	342.58	1.08	9.44	26	10.9	0.6	1	4
11	7.73	0.35	0.14	58.03	281.09	0.64	7.34	18	11.7	0.7	1.3	3.6
12	7.8	0.29	0.22	66.32	278.34	0.6	7.2	29.2	10.1	0.5	1	5.3
13	7.71	0.28	0.24	49.74	203.68	0.72	7.9	14.3	9.76	0.7	1.3	4.9
14	7.76	0.25	0.26	20.72	281.09	0.86	9.5	20.16	11.36	0.62	0.95	4.15
15	7.58	0.29	0.31	43.52	284.38	0.6	9.22	14.3	12.1	0.7	1.2	5.4
16	7.7	0.3	0.19	31.09	277.25	0.8	8.74	13.3	11.6	0.6	1.3	5.1
17	7.82	0.27	0.24	41.45	269.56	0.8	8.18	38.2	10.6	0.6	1.25	4.05
18	7.93	0.37	0.26	18.65	355.75	0.94	6.84	11.7	12	0.9	2.1	6.7
19	7.76	0.28	0.19	22.8	332.15	0.7	7.62	38.7	10.4	0.7	1.1	4.8
20	7.89	0.25	0.28	58.03	321.71	0.62	8.74	31.3	10.4	1	1.1	5.2

*=Miliequivalent

Soil Fertility Index & Soil Test Rating:

Samples site:

Village :Sonar, Taluka: Sami, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous (Kg/Hectare)	Pottash (Kg/Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/100 gm soil)	Ca (Me*/100 gm soil)
M	20	0	0	14	13	18	19	10	9	0	14	0
H	0	0	0	2	7	2	1	10	11	20	5	20
%L	0	100	100	20	0	0	0	0	0	0	5	0
%M	100	0	0	70	65	90	95	50	45	0	70	0
%H	0	0	0	10	35	10	5	50	55	100	25	100
S.F.I.*	2.00	1.00	1.00	1.90	2.35	2.10	2.05	2.50	2.55	3.00	2.20	3.00
LMH** of SFI	M	L	L	M	H	M	M	H	H	H	M	H

*= Soil Fertility Index, **= Low, Medium, and High Soil Fertility Index

CONCLUSION:- Above Results Indicate That E.C & Zn are Low in Amount, Zinc Sulphate Should be added For Better Plant Growth and Productivity. The Other Parameters are sufficient in Limit. pH is in High Limit So it can be Neutralized by using Acidic Fertilizer.

Samples site:

Village :Anavrapura, Taluka: Sami, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/ Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/100 gm soil)	Ca (Me*/100 gm soil)
1	8.76	0.32	0.62	53.88	606.97	0.24	9.14	33.95	9.28	1.52	0.45	19.35
2	8.67	0.36	0.6	51.81	620.92	0.28	10.6	35.01	16.2	1.94	1.25	20.05
3	8.83	0.33	0.76	76.68	638.49	0.36	15.6	33.95	13.5	1.74	0.5	19.4
4	8.75	0.32	0.49	66.32	626.96	0.3	10.5	39.78	9.46	1.52	2.2	20.5
5	8.17	1.32	0.69	58.03	640.63	0.38	10	39.25	12.4	1.52	2.1	20.4
6	8.44	1.52	0.88	68.39	616.5	0.46	10.1	33.42	11.7	1.6	1.05	19.85
7	8.54	0.7	0.57	55.95	577.95	0.3	9.8	38.72	10.4	1.42	0.9	16.6
8	8.5	0.96	0.53	82.89	555.59	0.4	10	40.84	12.2	1.68	3.4	20.4
9	8.56	0.62	0.59	64.24	546.8	0.3	10.4	34.48	12.5	1.86	1.95	12.85
10	8.41	1.21	0.72	78.75	566.57	0.48	10.4	39.78	13.6	1.76	8	15.6
11	8.36	1.33	0.67	51.81	589.08	0.32	8.96	36.6	10.8	1.5	2.9	19.6
12	8.51	0.75	0.78	60.1	534.73	0.76	9.1	40.84	14.3	1.9	7.35	18.15
13	8.7	0.32	0.49	72.53	641.78	0.22	9.18	31.83	9.08	1.52	5.8	15.4
14	8.31	0.42	0.73	76.68	637.94	0.44	9.5	35.54	13.3	1.76	8.25	17.05
15	8.37	1.24	0.78	53.88	645.79	0.36	9.68	40.84	14.1	1.42	8.4	16.7
16	8.13	1.64	0.85	66.32	556.69	0.26	9.18	34.48	13.9	1.4	6.85	15.85
17	8.3	1.34	0.82	58.03	616.53	0.32	9.74	36.07	15.4	1.62	6.35	14.95
18	7.96	0.7	0.71	68.39	524.3	3.18	10.3	37.66	11.9	1.38	5.5	15.3
19	8.36	1.11	0.49	55.95	564.37	0.34	10.4	37.66	11.8	1.54	6.65	16.25
20	7.94	0.34	0.97	82.89	601.7	0.54	9.82	41.9	21.2	1.78	4.9	13.5

*=Miliequivalent

Soil Fertility Index & Soil Test Rating:

Samples site:

Village :Anavrapura, Taluka: Sami, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/ Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/ 100 gm soil)	Ca (Me*/ 100 gm soil)
L	0	12	3	0	0	17	0	0	0	0	3	0
M	4	8	10	8	0	2	12	0	3	0	3	0
H	16	0	7	12	20	1	8	20	17	20	14	20
%L	0	60	15	0	0	85	0	0	0	0	15	0
%M	20	40	50	40	0	10	60	0	15	0	15	0
%H	80	0	35	60	100	5	40	100	85	100	70	100
S.F.I.*	2.80	1.40	2.20	2.60	3.00	1.20	2.40	3.00	2.85	3.00	2.55	3.00
LMH** of SFI	H	L	M	H	H	L	H	H	H	H	H	H

*= Soil Fertility Index, **= Low, Medium, and High Soil Fertility Index

CONCLUSION:- Above Results Indicate That E.C & Zn are Low in Amount, Zinc Sulphate Should be added For Better Plant Growth and Productivity. The Other Parameters are sufficient in Limit. pH is in High Limit So it can be Neutralized by using Acidic Fertilizer.

REFERENCES:

1. Erdal Sakin, African Journal of Biotechnology Vol. 11(6), pp. 1373-1377, 2012
2. M. Bernoux, D. Arrouays, C. Cerri, B. Volkoff, and C. Jolivet Soil Sci. Soc. Am. Journal, Vol.62, pp.743 – 749,1998
3. Pang, X.P. & Letey. Soil Science Society of America Journal 64 (1) pp. 247-253,2000
4. Lal, R., & Shukla, M.K. The dynamics of soil quality as a measure of sustainable management P37-51, 2004
5. Mitchell, C.C. (editor). Ser. Bul. No. 380. Alabama Agric, 1994.
6. R. Laiho, T. Penttilä, and J. Laine, Silva Fennica, Vol. 38(1), pp. 29-41, 2004.