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Physicochemical Analysis of different soil samples from villages of Radhanpur Taluka, Patan District

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ABSTRACT:

Analysis of soil was carried out for the detailed studies of different parameters like total Organic Carbon, Phosphorus, Potash, pH, calcium, magnesium, sulphur, copper, zinc, manganese, magnesium and electrical Conductivity. 5 representative locations were selected for the study and 20 samples from each location and direction of area were collected. This present study leads us to the conclusion of the nutrient's status present in soil of Villages from , District Patan, North Gujarat. Results show that all the five selected Villages of Patan District have medium minerals content. This information regarding to nutrients will help farmers to solve the problems related to soil nutrients, amount of which fertilizers to be used to increase the yield of crops.

Key Words: Physicochemical, Conductivity, Organic carbon

INTRODUCTION:

Soil is a vital component, medium of unconsolidated nutrients and materials, forms the life layer of plants. It is a basic life support components of biosphere. The physicochemical study of parameters is important to agricultural chemists for plants growth and soil management.[1-2] A collection of soil samples from five villages of Radhanpur Tehsil, Patan District, North Gujarat which represent soils of that village. The soil samples were collected by standard procedure and collected in polythene bags. All the samples were collected in summer season. In laboratory these samples were analysed to measure various chemical parameters by standard methods.[3] Analysis of soil is carried out for the studies of various parameters like total Organic Carbon, Phosphorus and Potash, pH measurement and estimations of calcium, magnesium, sulphur, copper, zinc, manganese, magnesium and electrical Conductivity. % of soil was studied.

There are important and essential elements required for plant growth: carbon, hydrogen, oxygen, phosphorus, potassium, calcium, magnesium, sulphur, iron, manganese, zinc, copper, boron, molybdenum, chlorine, and nickel. Plants obtain carbon, hydrogen, and oxygen from air and water. The remaining elements are derived from the soil. When the soil cannot supply the amount of these nutrients required for adequate growth, supplemental fertilizer applications become necessary. Nitrogen, phosphorus, and potassium are often referred to as the primary macronutrients, because of the general probability of plants being

deficient in these nutrients and the large quantities taken up from the soil compared to other essential nutrients. The fertility of the soil depends on the concentration of N, P, K, organic and inorganic materials and water. The physicochemical properties such as moisture content, specific gravity Nitrogen as a fertilizer required for the growth of plant. Potassium is used for flowering purpose and phosphate is used for growth of roots in plants. [2, 4-6]

In India, now a day's large numbers of fertilizers are used instead of manures. Due to this the crop productivity is increases speedily but the quality of soil support decreases. So it becomes essential to analysis the soil parameters. It is a real time to carry out the physicochemical analysis of soil because as with the increasing use of chemical fertilizer to the soil, it is difficult to control the adverse effects of the chemicals fertilizer to the soil, plants, animals and human being [7-8]

Plant Nutrients

Although plants absorb a large number of elements, all of them are not essential for the growth of plant. The elements which are required by plant for their normal growth, development, metabolism and to complete their life cycle are called the essential ones. Some of these are required in large amounts and some in traces. Nutrients are classified as Primary (Macro), Secondary and micro, and are further classified as follow:

Major nutrients required for plant growth

Class 1: Carbon, hydrogen and oxygen (C,H, O).

Class 2: Nitrogen, potassium and phosphorus.

Secondary Nutrients: Magnesium, Calcium and sulphur

Micro nutrients: Iron, boron, zinc, molybdenum, manganese, copper and chlorine.

It has been observed that the presence of some elements are essential for plant growth and are not directly concerned in the nutrition of the plant, but are present in the plants used as food and feed, are of vital importance to the health of man and animals. The elements within this group are iodine, cobalt and sodium. In addition, there is another group of elements which are toxic to the animals feeding on the plants containing them. These are selenium, lead, thallium, arsenic and fluorine.

Soil testing refers to the quantitative chemical analysis of soils and is recognized as a scientific means for quick characterization of the fertility status of soils. We can predict the nutrient requirement of crops from soil testing and can recommend suitable and economic nutrient doses through chemical fertilizers and organic manure for different corps and cropping systems. It also includes testing of soils for other properties like soil texture, structure, pH, cation exchange capacity, water holding capacity, electrical conductivity. Our main objective of soil tests is to sort out the nutrient deficient areas from non-deficient ones. This information is very important for determining whether the soils could supply adequate nutrients for optimum crop production or not, as farmers attempt to increase their crop production. Fertilizer use could be aimed at economic optimum yield per hectare. The concept of balanced nutrition of crops also guides the use of plant nutrients in a definite proportion as required by the crops which is possible only if one knows the available nutrient status of his soils**.** Soil testing helps in understanding the inherent fertility status of the soils. Further, various factor other than poor soil fertility may also be responsible for poor crop production but soil fertility status assumes a greater importance. Each fertilizer recommendation based on a soil analysis should take into account the soil test value obtained by the accurate soil analysis, the research work conducted on a crop response to fertilizer application in a particular area and the practices and level of management of the concerned farmer. The soil test aimed at soil fertility evaluation with resulting fertilizer recommendation

is, therefore, the actual connecting link between the agronomic research and its practical application to the farmers' field.
Soil testing can be divided into four steps (1) Sampling (2) Analysis (3) Interpretation and (4) Recommendations. One of the most important aspects of soil testing is that of obtaining a representative sample of the area.

CHEMICAL & EQUIPMENTS

Buffer tablet, Potassium Chloride, Potassium Dichromate, Sulphuric acid, Sodium bicarbonate, activated charcoal (phosphorous free), Ammonium Molybdate, Stannous chloride, Ammonium acetate, Calcium chloride, Glacial acetic acid, Barium Chloride, Gum acacia, Sodium diethyl dithiocarbomate, Sodium Hydroxide, Muroxide, Ethylene di amine tetraacetate, Ammonia buffer, Eriochrome Black-T, Diethylenetriamine pentaacetic acid were procured from S.D. Fine Chem. Ltd. and all 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 nutrition was analyzed on Double beam atomic absorption spectrophotometer (Elico Model No-SL 194).

METHOD OF ANALYSIS:-

(1) Magnesium

5 g air dried soil sample was taken in conical flask. To this 25ml 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 pipette 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.

(2) 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	22
3	2 ml = 4 ppm	5 ml	5 ml	1 ml	40
4	3 ml = 6 ppm	5 ml	5 ml	1 ml	57
5	4 ml = 8 ppm	5 ml	5 ml	1 ml	82
6	5 ml = 10 ppm	5 ml	5 ml	1 ml	102
7	10 ml = 20 ppm	5 ml	5 ml	1 ml	195
	Total = 50 ppm				498

Calculation

1 Reading

= Total Solution of ppm / Total Reading
=50 / 498
= 0.100
0.1010 Microgram P (Graph Factor)

1 Gram Soil = R X 0.1010 X 4 Microgram P/ Gram Soil
R =Colorimeter Reading of Sample 0. 1010= Graph Factor
P Kg/ Hector = 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 gm 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 solution and notes the optical density.

(3) Electrical Conductivity (E.C.)

10 gm 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 ^{0}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.

(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 ^{0}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. Immerses electrode in above suspense solution and note the reading.

(5) 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	45.5
4	2.0ml	20ppm	52.5
5	2.5ml	25ppm	68.5
6	3.0ml	30ppm	76
7	4.0ml	40ppm	98
	Total	140ppm	380.5

Calculation

1 Reading = Total Solution of ppm / Total Reading
=140 / 380.5
= 0.368

1 Gram Soil = R X 0.368 X 5 Microgram K / Gram Soil (0.368 Graph Factor)
R= Flame Photometer Reading of sample

K
Kg/Hectare = R X 0.368 X 5 X 2.24 (2.24 = Factor in **K** Hectare)

K_2O
Kg/Hectare = R X 0.368 X 5 X 2.24 X 1.20 (1.20 = Factor in **K_2O** Hectare)
= R X 4.945

Process:

5 gm 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. Calibrated flame photo meter 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.

(6) Calcium

5 gm 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 used EDTA solution.

(7) 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 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. Take 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	67
4	3	0.015 g	96
5	4	0.020 g	125
6	5	0.025 g	155
7	6	0.030 g	181
	Total	0.105 g	654

Calculation:-

1 Reading

1 Reading = Total Amount of Sucrose / Total Reading

= 0.00016055
= 0.000161043 gm Sucrose

1 Reading Carbon value:

0.00006743
0.00006764 gram organic carbon

1 Reading Graph Factor Value = 0.000067638 X 100
= 0.0067638

Process:

1 gm soil sample was taken 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 added and allowed for 12 hrs, then first set zero optical density using blank solution (as above method without taking soil sample) measured optical density (O.D) by using red filter.

(8) Sulphur

Method for making standard graph for Sulphur

Weighted out 5.434 gm 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, first set zero optical density using blank solution and measured optical density (O.D) by 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	33
5	4	4	40
6	5	5	53
7	6	6	63
8	7	7	80
9	8	8	109
10	10	10	122
	Total ppm	46	Total: 533

Calculation:-

1 Reading = Total ppm of Sulphar/Total reading

1 Reading = 46/533
=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 on whatman filter No. 42. 20 ml filtrate was taken in 25 ml volumetric flask. 2 ml glacial acetic acid, 1 gm 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 density (O.D) by using by using blue filter.

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

Method for making 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, D.T.P.A & T.E.A solution in calcium chloride dihydrate solution was added and adjusted pH 7.3 by using add 1M HCl. Make up 1 ltr with distilled water.

Method for micronutrients (Cu, Fe, Mn, Zn) analysis

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 hr. Filtered it on whatman filter No.40 in funnel cum test tube. Prepared standard curved 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. Obtain ppm reading multiply with factor 2.0.

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:-

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/Hector	<26	26-60	>60
5	Potash	Kg/Hector	<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 soil fertility Index:

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

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

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

Samples site:

Village :Dharvadi, Taluka:Radhanpur, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous Kg/ Hector	Potash Kg/ Hector	Zn Ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg Me*/100 gm soil	Ca Me*/100 gm soil
1	8.36	1.17	0.7	51.81	629.7	0.22	10.7	35.54	18.5	1.4	3.65	9.35
2	8.39	0.67	0.74	60.1	583.59	0.46	6.5	39.78	11.5	0.98	5.2	12.7
3	8.59	0.28	0.55	72.53	534.76	0.18	6.82	36.07	13	0.74	3	9
4	8.52	0.41	0.68	76.68	640.68	0.48	7.76	33.42	12.4	0.86	2.3	12
5	8.55	0.41	0.74	53.88	615.89	0.26	7.34	42.44	12.1	0.88	3.5	12.2
6	8.57	0.32	0.6	66.32	562.88	0.2	6.78	34.48	11.9	0.82	2.25	9.15
7	8.46	0.69	0.85	58.03	566.57	0.38	10.34	35.01	16.8	1.4	4	11.2
8	8.46	0.6	0.67	68.39	604.38	1.04	8.88	41.9	15.8	1.12	4.2	9.9
9	8.69	0.62	0.57	60.1	605.55	0.22	7.64	40.84	8.1	1.1	3.1	13.1
10	8.53	0.29	0.56	74.6	551.75	0.74	8.62	36.07	13.8	1.1	2.55	15.9
11	8.31	0.44	0.58	55.95	602.8	0.3	9	37.66	13.7	1.28	2.25	13.6
12	8.57	0.77	0.41	82.89	577	0.16	6.72	35	10.8	0.84	1.8	14.7
13	8.6	0.42	0.35	68.39	568.1	0.28	2.98	37.13	12.8	0.56	3.2	11
14	8.53	0.58	0.43	64.24	638.51	0.28	5.36	40.84	16	0.98	4.6	11.9
15	8.49	0.83	0.56	78.75	584.14	0.7	6.64	35.54	16.5	1.02	4	11.5
16	8.49	0.51	0.48	62.17	505.99	0.28	4.46	41.9	14.5	0.66	3	12.2
17	8.53	0.85	0.73	66.32	566.57	0.2	5.22	36.6	12.3	0.74	3	11.4
18	8.46	0.45	0.56	70.46	592.37	1.64	7.28	31.83	15.1	0.98	1.2	14.8
19	8.33	0.49	0.32	74.6	214.04	0.12	3.22	32.89	6.96	0.5	0.5	11.2
20	8.88	0.32	0.45	51.81	420.32	0.16	4.36	38.72	11.6	0.84	1.65	12

***=Miliequivalent**

Soil Fertility Index:

Samples site:

Village :Dharvadi, Taluka:Radhanpur, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous Kg/ Hector	Potash Kg/ Hector	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg Me*/100 gm soil	Ca Me*/100 gm soil
L	0	19	6	0	0	16	4	0	0	0	1	0
M	0	1	13	5	1	2	14	0	2	0	3	0
H	20	0	1	15	19	2	2	20	18	20	16	20
%L	0	95	30	0	0	80	20	0	0	0	5	0
%M	0	5	65	25	5	10	70	0	10	0	15	0
%H	100	0	5	75	95	10	10	100	90	100	80	100
S.F.I.*	3.00	1.05	1.75	2.75	2.95	1.30	1.90	3.00	2.90	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

Samples site:

Village :Badarpura, Taluka:Radhanpur, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous Kg/ Hector	Potash Kg/ Hector	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg Me*/100 gm soil	Ca Me*/100 gm soil
1	8.15	0.9	0.32	53.88	579.74	0.54	4.78	42.44	16.5	1.8	4.85	16.65
2	8.2	1	0.44	58.03	453.79	0.56	2.18	38.72	13.28	1.6	5.85	18.65
3	7.95	1.2	0.28	68.39	451.11	0.52	7.08	31.83	19.42	1.5	3	6.1
4	8.38	0.7	0.58	66.32	313.23	0.5	2.26	37.66	12.46	1.14	3.85	15.35
5	8.48	0.34	0.4	47.66	247.64	0.34	1.6	35.54	11.82	0.96	3.1	18.7
6	8.49	0.31	0.24	53.88	191.1	0.4	1.98	36.07	10.24	0.84	1.5	15
7	8.46	0.29	0.24	62.17	299.85	0.54	1.66	42.44	11.54	0.84	4.6	17.8
8	8.46	1	0.57	45.59	392.21	0.44	1.6	40.84	11.16	1.44	2.3	16.2
9	8.69	0.42	0.41	70.46	353.39	0.46	2.66	32.36	14.94	1.38	3.2	14.2
10	8.6	0.44	0.45	60.1	410.95	0.4	3.24	38.19	15.12	1.2	1.85	15.45
11	8.46	1.93	0.49	51.81	512.68	0.82	2.82	37.66	14.54	1.48	3.15	15.25
12	8.5	1.75	0.53	53.88	480.56	0.6	1.94	33.95	12.9	1.12	3.15	17.35
13	8.27	0.92	0.34	68.39	279.77	0.48	2.54	38.72	12.48	0.82	3.9	12.3
14	8.77	0.23	0.26	58.03	226.22	0.38	1.74	42.44	12.68	0.7	2.9	14.3
15	8.78	0.2	0.24	45.59	236.93	0.58	2.18	32.89	13.8	1.6	1.6	10.6
16	8.35	0.62	0.7	53.88	572.61	0.56	2.28	35.54	14.78	1.92	3.75	19.95
17	8.39	1	0.53	68.39	566.23	0.4	1.38	35.01	11.16	1.12	3.25	21.35
18	8.72	0.73	0.37	47.66	299.85	0.34	1.32	41.37	8.94	0.84	3.25	22.95
19	8.88	0.56	0.32	51.81	199.45	0.6	4.7	38.72	14.92	1.92	4.05	20.85
20	8.85	1	0.73	58.03	433.71	0.58	3.92	39.25	14.48	1.88	1.65	11.65

*=Miliequivalent

Soil Fertility Index:

Samples site:

Village :Badarpura, Taluka:Radhanpur, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous Kg/ Hector	Potash Kg/ Hector	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg Me*/100 gm soil	Ca Me*/100 gm soil
L	0	13	14	0	0	9	19	0	0	0	0	0
M	3	7	6	13	8	11	1	0	1	0	4	0
H	17	0	0	7	12	0	0	20	19	20	16	20
%L	0	65	70	0	0	45	95	0	0	0	0	0
%M	15	35	30	65	40	55	5	0	5	0	20	0
%H	85	0	0	35	60	0	0	100	95	100	80	100
S.F.I.*	2.85	1.35	1.30	2.35	2.60	1.55	1.05	3.00	2.95	3.00	2.80	3.00
LMH** of SFI	H	L	L	H	H	L	L	H	H	H	H	H

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

Samples site:

Village :Najupura, Taluka:Radhanpur, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous Kg/ Hector	Potash Kg/ Hector	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg Me*/100 gm soil	Ca Me*/100 gm soil
1	8.13	0.33	0.39	24.87	528.69	0.74	11.62	17.5	11.86	2.04	1.55	6.75
2	8.17	0.29	0.3	18.65	441.95	1.46	11.42	16.44	10.98	1.54	3.4	6
3	8.13	0.3	0.34	41.45	396.93	0.68	8.8	34.48	9.84	1.54	3.5	6.6
4	8.36	0.28	0.28	29.01	446.34	0.72	11.58	20.16	11.26	1.4	0.9	7.4
5	8.18	0.3	0.32	33.16	342.03	0.74	12.12	37.13	13.6	1.54	1.65	7.25
6	8.13	0.39	0.32	37.3	435.36	1.14	12.12	32.89	15.18	1.4	1.35	7.45
7	8.12	0.38	0.34	66.32	424.38	0.68	10.86	23.87	11.4	1.26	2.8	6.6
8	8.07	0.37	0.35	51.81	495.75	0.68	9.68	28.64	10.78	1.2	1.25	6.15
9	8.03	0.43	0.29	82.89	394.18	0.52	8.44	27.58	9.62	0.96	3.35	5.75
10	8.1	0.36	0.34	33.16	484.77	0.7	7.96	22.81	9.82	1.04	1.9	7
11	8.23	0.19	0.37	68.39	355.75	0.68	7.42	14.85	8.94	0.62	0.35	8.75
12	8.19	0.33	0.32	31.09	417.24	0.7	9.1	23.34	11.3	0.88	1.35	5.75
13	8.18	0.37	0.35	53.88	509.47	0.72	9.26	18.57	10.58	1.26	1.2	7.1
14	8.2	0.32	0.39	37.3	484.77	0.72	8.08	33.42	9.9	0.96	0.75	7.35
15	7.86	0.36	0.38	20.72	333.79	0.7	9.5	20.16	11.52	1.12	1.15	7.25
16	7.92	0.47	0.6	58.03	451.83	0.86	9.16	19.63	16.48	0.78	0.65	7.55
17	8.11	0.54	0.41	35.23	665.94	0.86	8.44	39.25	16.66	1.04	0.75	7.35
18	8.13	0.37	0.29	47.66	693.39	0.72	10.24	19.63	12.06	1.04	0.7	7.2
19	8.17	0.29	0.32	66.3	514.96	0.72	9.68	21.22	11.6	1.26	0.9	7.4
20	8.08	0.43	0.39	41.45	440.85	0.76	11.3	19.1	13.12	1.48	0.5	7.6

***=Miliequivalent**

Soil Fertility Index:

Samples site:

Village :Najupura, Taluka:Radhanpur, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous Kg/ Hector	Potash Kg/ Hector	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu Ppm	Mg Me*/100 gm soil	Ca Me*/100 gm soil
L	0	20	19	3	0	0	0	0	0	0	8	0
M	18	0	1	13	0	18	12	7	5	0	8	0
H	2	0	0	4	20	2	8	13	15	20	4	20
%L	0	100	95	15	0	0	0	0	0	0	40	0
%M	90	0	5	65	0	90	60	35	25	0	40	0
%H	10	0	0	20	100	10	40	65	75	100	20	100
S.F.I.*	2.10	1.00	1.05	2.05	3.00	2.10	2.40	2.65	2.75	3.00	1.80	3.00
LMH** of SFI	M	L	L	M	H	M	H	H	H	H	M	H

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

Samples site:

Village :Limbadka, Taluka:Radhanpur, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous Kg/ Hector	Potash Kg/ Hector	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg Me*/100 gm soil	Ca Me*/100 gm soil
1	8.68	0.31	0.22	37.3	349.16	0.36	12.7	33.42	12.84	1.02	1.25	4.65
2	8.51	0.41	0.19	55.95	266.81	0.24	11.78	24.4	11.44	0.5	1.3	5.4
3	8.48	0.33	0.27	41.45	634.1	0.36	19.72	13.79	15.48	2.76	1	11.2
4	8.25	0.56	0.26	45.59	645.62	0.34	14.06	25.99	18.68	1.24	0.5	6.6
5	8.88	0.41	0.3	43.52	594.57	0.24	17.1	32.36	12.5	2.02	1.1	12.9
6	8.16	0.93	0.17	47.66	248.7	0.28	13.34	35.54	14.46	0.54	0.9	9.3
8	8.7	0.45	0.34	64.24	686.25	0.28	19.28	15.38	15.38	2.72	1.7	13.1
7	8.14	0.48	0.24	62.17	398.03	0.16	16.16	15.91	13.36	2.02	1.15	11.55
9	8.62	0.31	0.24	58.03	656.6	0.3	18.76	30.24	19.08	2.6	1.05	12.35
10	8.69	0.36	0.21	43.52	588.53	0.58	14.34	15.38	12.18	1.58	0.95	5.45
11	8.24	0.24	0.15	99.47	661	0.8	18.2	16.44	12.42	2.86	0.6	10.4
13	8.32	0.41	0.17	62.17	618.17	0.36	19.36	15.38	17.34	2.76	0.65	10.65
12	8.03	0.47	0.09	72.53	353.01	0.24	14.5	25.99	13.08	1.72	0.55	10.95
14	8.16	0.27	0.2	51.81	560.53	0.34	17.96	24.93	15.38	2.3	1.2	14.1
15	8.34	0.33	0.12	35.23	367.83	0.32	14.94	38.72	11.96	1.98	0.55	11.65
16	8.11	1	0.24	37.3	321.71	0.3	12.22	29.7	11.48	1.62	1.4	10.4
17	7.95	0.42	0.14	26.94	499.59	0.44	19.3	32.36	22.62	2.34	1.4	9.3
18	8.5	0.42	0.19	35.23	573.71	0.8	20	38.19	26.28	3.04	0.3	11.7
19	8.35	0.43	0.12	31.09	332.15	0.26	14.7	27.05	12.14	1.86	1.75	13.75
20	8.27	0.4	0.14	37.3	356.3	0.24	14.6	14.85	14.08	1.58	2.35	13.45

***=Miliequivalent**

Soil Fertility Index:

Samples site:

Village :Limbadka, Taluka:Radhanpur, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous Kg/ Hector	Potash Kg/ Hector	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg Me*/ 100 gm soil	Ca Me*/ 100 gm soil
L	0	19	20	0	0	17	0	0	0	0	8	0
M	6	1	0	15	2	3	0	7	0	0	11	0
H	14	0	0	5	18	0	20	13	20	20	1	20
%L	0	95	100	0	0	85	0	0	0	0	40	0
%M	30	5	0	75	10	15	0	35	0	0	55	0
%H	70	0	0	25	90	0	100	65	100	100	5	100
S.F.I.*	2.70	1.05	1.00	2.25	2.90	1.15	3.00	2.65	3.00	3.00	1.65	3.00
LMH** of SFI	H	L	L	M	H	L	H	H	H	H	L	H

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

Samples site:

Village :Vijaynagar, Taluka:Radhanpur, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous Kg/ Hector	Potash Kg/ Hector	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg Me*/100 gm soil	Ca Me*/100 gm soil
1	7.9	0.22	0.43	62.17	278.89	0.54	9.44	27.05	23.94	1.82	1.4	7.6
2	7.56	0.19	0.57	58.03	238.27	0.44	10.6	37.66	20.98	1.56	1.95	8.15
3	7.6	0.37	0.53	68.39	373.87	0.52	12.4	25.46	20.18	2.1	2.4	12.7
4	7.65	0.22	0.66	76.68	192.15	0.4	9.7	27.05	19.88	1.18	1.1	6.9
5	7.75	0.2	0.33	80.82	182.82	0.56	8.98	34.48	21.12	1.3	2.75	7.85
6	7.62	0.18	0.91	68.39	521.55	0.6	6.62	36.07	19.26	1	1.85	6.15
7	8.08	0.23	0.41	74.6	195.44	0.42	9.38	15.38	14.78	1.4	2.6	11.9
8	8.02	0.23	0.38	47.66	416.69	0.74	8.72	24.4	15.1	1.26	2.75	7.85
9	7.63	0.32	0.76	55.95	506.73	0.8	7.92	16.44	23.18	1.1	2.85	6.95
10	7.38	0.24	0.61	45.59	429.87	0.68	12.28	19.1	17.82	2.14	3.85	10.25
11	7.75	0.43	0.45	62.17	158.11	0.78	13.96	20.16	22.2	2.14	1.85	5.15
12	7.55	0.33	0.5	68.39	267.91	1.28	10.22	25.46	25	1.52	3.15	7.85
13	7.38	0.47	0.62	74.6	460.61	1.22	9.7	32.89	24.56	2.14	2.6	7.2
14	7.59	0.36	0.53	78.75	240.46	0.7	9.82	23.34	20.76	1.1	1.75	6.35
15	7.71	0.39	0.57	47.66	157.56	0.8	8.92	24.93	14.56	1.4	2.85	8.45
16	7.08	0.48	0.63	55.95	399.12	0.36	7.44	29.7	17.12	1.06	2.45	7.75
17	7.76	0.21	0.67	53.88	535.28	0.6	13.2	20.16	18.42	3	7.75	15.35
18	7.79	0.36	0.31	49.74	167.99	2.52	9.76	18.04	19.06	1.4	3.3	9.2
19	7.74	0.24	0.38	45.59	213.56	0.86	8.38	28.64	20.22	1	1.8	6.5
20	7.68	0.26	1.03	62.17	410.1	0.48	8.72	36.07	17.16	0.72	2.25	8.15

***=Miliequivalent**

Soil Fertility Index:

Samples site:

Village :Vijaynagar, Taluka:Radhanpur, District: Patan, Gujarat, India.

No	pH	E.C.	Org. Carbon (%)	Phosphorous Kg/ Hector	Potash Kg/ Hector	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu Ppm	Mg Me*/100 gm soil	Ca Me*/100 gm soil
L	0	20	8	0	0	5	0	0	0	0	0	0
M	20	0	9	9	11	12	14	4	0	0	7	0
H	0	0	3	11	9	3	6	16	20	20	13	20
%L	0	100	40	0	0	25	0	0	0	0	0	0
%M	100	0	45	45	55	60	70	20	0	0	35	0
%H	0	0	15	55	45	15	30	80	100	100	65	100
S.F.I.*	2.00	1.00	1.75	2.55	2.45	1.90	2.30	2.80	3.00	3.00	2.65	3.00
LMH** of SFI	M	L	M	H	H	M	M	H	H	H	H	H

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

REFERENCES:

1. L Jaishree; Somwanshi; SK Akuskarint; Int.J.chem.Sci.2008, 6(1), 255-261.
2. K Kanimozhi; A Panneerselvam; *Archives of Applied Science Research.* 2011, 3 (2), 525-536.
3. AK Gupta, MLVarshaney; Practical *Manual for Agricultural Chemistry. Kalyani Publisher.*, 1994**.**
4. N. S .Sonawane; C. P. Sawant, R.V. Patil, *Archives of Applied Science Research.*, 2013, 5(2):294-298.
5. N. N. Garba, A.Isma'lla, U.K. Asma, Z. N. Garba, B.I. Tijjni,;*European Journal of Applied Engineering and Scientific Research.*, 2013, 2 (2):23-27.
6. K. P. Kordlaghari, S .N. Sisakht, A. Saleh, *Annals of Biological Research.*, 2013, 4 (3):105-108.
7. Kulkarni A.N., Balkhande J.V., Waghmare B.D., Ratnakar P.U and Kanwatr V.S., Studies of Some Physicochemical Factors of Teak Forest from Kinwat Area, Nanded, Int. J. Life Science, 437-438 (2011)
8. Raut P.P. and Ekbote P.D., Physicochemical Analysis of Soil Collected from Babhulgaon Region, Dist. Yavatmal (MS), Int.J. of Basic and Applied Research Special Issue,112-116(2012)