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Study of Soil Properties of Visnagar Taluka, District Mehsana

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Abstract

This paper presents the study of agricultural soil of Visnagar tahsil of Mehsana district, Gujarat. The samples location areas were approximately 5-10 Kilometer from each other. All soil samples were analyzed for 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. Five representative locations were selected for study and 20 samples from each location & direction of area were collected. The main aim of this paper is to study soil fertility status of soil samples. This information will be helpful to the farmers to solve the problems related to soil nutrients amount of which fertilizers to be added to soil to increase the yield of crops.

Keywords: Agricultural, Soil, Electrical conductivity, Fertility status.

INTRODUCTION:

Indicators of soil quality can be categorized into four general groups: visual, physical, chemical, and biological. Visual indicators may be obtained from observation or photographic interpretation. Exposure of subsoil, change in soil color, ephemeral gullies, ponding, runoff, plant response, weed species, blowing soil, and deposition are only a few examples of potential locally determined indicators. Visual evidence can be a clear indication that soil quality is threatened or changing. Physical indicators are related to the arrangement of solid particles and pores. Examples include topsoil depth, bulk density, porosity, aggregate stability, texture, crusting, and compaction. Physical indicators primarily reflect limitations to root growth, seedling emergence, infiltration, or movement of water within the soil profile. Chemical indicators include measurements of pH, salinity, organic matter, phosphorus concentrations, cation-exchange capacity, nutrient cycling, and concentrations of elements that may be potential contaminants (heavy metals, radioactive compounds, etc.) or those that are needed for plant growth and development. The soil's chemical condition affects soil-plant relations, water quality, buffering capacities, availability of nutrients and water to plants and other organisms, mobility of contaminants, and some physical conditions, such as the tendency for crust to form. Biological indicators include measurements of micro and macro-organisms, their activity, or by products. The concept of soil quality has been suggested by several authors [1- 6] as a tool for assessing long-term sustainability of agricultural practices at local, regional, national, and international levels. This suggestion was reinforced by a

recent report from the National Academy of Sciences, National Research Council (1993) recommending that the United States adopt a national policy which seeks to conserve and enhance soil quality as a fundamental first step to environ-mental improvement. My objectives for this report are (1) to review current efforts to define soil quality; (2) to discuss factors and processes which influence soil quality; (3) to identify soil and crop management practices that affect processes influencing soil quality; and (4) to demonstrate a potential method for evaluating soil quality.

Doran and Paikill (1994) [7] suggested that soil quality assessments could be used as a management tool or aid to help farmers select specific management practices and as a measure of sustainability. They also suggested that approaches used to define and assess soil quality should be tailored for specific applications such as sustainable production, environmental quality, and animal or human health. Soil quality may also provide a focal point or vocabulary for communication between scientists and non-scientists, if the concept can be clearly defined. Several definitions have been proposed in an attempt to define soil quality, but unlike air quality or water quality for which the U.S. has established standards through legislation, the concept remains difficult to define and quantify.

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 dithiocarbomate, 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) 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	25
3	2	0.010 g	65
4	3	0.015 g	92
5	4	0.020 g	122
6	5	0.025 g	153
7	6	0.030 g	186
	Total	0.105 g	643

Calculation:-

1 Reading

1 Reading = Total Amount of Sucrose / Total Reading
= 0.000163297
= 0.000161043 g Sucrose

1 Reading Carbon value:
0.00006858
0.00006764 gram organic carbon

1 Reading Graph Factor Value = 0.000067638 X 100
= 0.0067638

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.

(2) 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	33
5	4	4	44
6	5	5	53
7	6	6	65
8	7	7	82
9	8	8	103
10	10	10	130
	Total ppm	46	Total: 543

Calculation:-

1 Reading = Total ppm of Sulphar/Total reading

1 Reading = 46/543
=0.08

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.

(3) pH

10 g soil & 20 ml distilled water were taken in 50 ml beaker & stirred for 30 min. In 50 ml beaker taken 10 g 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 with distilled water and clean by filter paper. Immerses electrode in above suspense solution and note the reading.

(4) 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	23
3	2 ml = 4 ppm	5 ml	5 ml	1 ml	40
4	3 ml = 6 ppm	5 ml	5 ml	1 ml	53
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	194
	Total = 50 ppm				494

Calculation

1 Reading

= Total Solution of ppm / Total Reading
=50 / 494
= 0.101
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/ Hectare = R X 0.1010 X 4 x 2.24 (2.24 = Factor in 'P' Hectare)
P_2O_5 Kg/ Hectare = R X 0.1010 X 4 x 2.24 X 2.29 (2.29 = Factor in 'P_2O_5 ' Hectare)
P_2O_5 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.

(5) 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.

(6) 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.

(7) 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 readin

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	100
	Total	140ppm	382.5

Calculation

1 Reading = Total Solution of ppm / Total Reading
=140 / 382.5
= 0.366

1 Gram Soil = R X 0.366 X 5 Microgram K / Gram Soil (0.366 Graph Factor)
R= Flame Photometer Reading of sample

K
Kg/Hectare = R X 0.366 X 5 X 2.24 (2.24 = Factor in **K** Hectare)

K_2O
Kg/Hectare = R X 0.366 X 5 X 2.24 X 1.20 (1.20 = Factor in **K_2O** Hectare)
= R X 4.919

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.

(8) 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 ^{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.

(9) 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 multiped with factor 2.0.

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

Result and Discussion

Critical Limits of Nutrients:-

Calculation of soil fertility Index:

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

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 : Ghaghret, Taluka: Visnagar, District: Mehsana, Gujarat, India.

Sample No.	pH	EC	Org.Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/100 g soil)	Ca (Me*/100 g soil)
1	8.64	0.17	0.69	49.74	315.91	0.24	2.66	9.02	6.6	0.88	2.6	6.6
2	8.62	0.12	0.82	43.52	349.37	0.22	2.82	10.08	8.86	1	3.45	5.55
3	8.65	0.16	0.89	89.11	155.28	0.2	4.62	8.49	1.22	1.02	2.7	6.7
4	8.38	0.16	0.79	58.03	263.70	0.2	2.54	6.90	6.04	0.92	1	8.3
5	8.4	0.16	0.78	93.26	261.03	0.24	2.44	6.37	4.34	0.86	1.35	7.55
6	8.9	0.11	0.83	70.46	195.44	0.58	2.66	7.43	5.18	0.96	3.05	6.75
7	8.23	0.23	0.68	58.03	218.19	0.2	2.44	8.49	0.76	0.78	1.6	7.7
8	8.3	0.11	0.84	64.24	246.30	0.16	2.5	5.30	4.02	0.98	1.6	7.9
9	8.62	0.14	0.70	51.81	313.23	0.18	2.82	6.90	5.68	1.04	2	7.5
10	8.73	0.12	0.68	87.04	223.55	0.16	2.38	7.43	1.7	0.96	1.7	7.7
11	8.76	0.13	0.55	70.46	278.43	0.16	2.6	9.55	4.68	1.08	1.95	7.45
12	8.28	0.22	0.83	91.18	254.33	0.3	2.7	9.55	10.6	1.28	2.75	8.15
13	9.18	0.16	0.58	60.10	186.07	0.2	2.5	5.30	5.88	0.98	1.65	5.95
14	8.34	0.27	0.88	70.46	161.97	0.26	2.6	10.08	9.86	1.14	2.2	8.2
15	8.64	0.31	0.83	95.33	322.60	0.66	2.6	10.61	15.16	1.2	3.05	7.75
16	8.8	0.18	0.63	78.75	267.72	0.2	2.5	7.43	4.26	0.8	2.3	5.2
17	8.48	0.17	0.70	84.97	295.83	0.2	2.44	7.43	5.06	0.94	1.1	8.3
18	8.23	0.24	0.76	95.33	313.23	0.22	2.44	7.43	6.24	0.88	0.6	7.7
19	8.85	0.17	0.78	64.24	369.45	0.24	2.82	7.96	6.36	0.86	2	7.2
20	8.69	0.17	0.61	76.68	265.04	0.62	2.38	7.96	5.12	0.88	0.85	7.05

*=miliequivalent

Soil Fertility Index & Soil Test Rating:-

Samples site:

Village : Ghaghret, Taluka: Visnagar, District: Mehsana, Gujarat, India.

Sample No.	pH	EC	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/100 g soil)	Ca (Me*/100 g soil)
L	0	20	0	0	0	17	20	17	7	0	2	0
M	0	0	9	5	14	3	0	3	11	0	10	0
H	20	0	11	15	6	0	0	0	2	20	8	20
%L	0	100	0	0	0	85	100	85	35	0	10	0
%M	0	0	45	25	70	15	0	15	55	0	50	0
%H	100	0	55	75	30	0	0	0	10	100	40	100
S.F.I.*	3.00	1.00	2.55	2.75	2.30	1.15	1.00	1.15	1.75	3.00	2.30	3.00
LMH** of SFI	H	L	H	H	M	L	L	L	M	H	M	H

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

CONCLUSION:- It is concluded from above analysis that E.C. & Zn & Fe & Sulphur are in low amount, Zinc Sulphate & Ferrous Ammonium Sulphate & Potassium Sulphate should be added for better plant growth & productivity. The other parameters are in limit. pH is in high limit so it can be neutralized by using acidic fertilizer.

Samples site:

Village :Ralisana, Taluka: Visnagar, District: Mehsana, Gujarat, India.

Sample No.	pH	EC	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/100 g soil)	Ca (Me*/100 g soil)
1	8.84	0.34	0.65	39.37	345.36	1.1	4.4	15.91	9.48	1.14	4.2	7.6
2	8.83	0.39	0.74	43.52	275.75	0.64	4.48	23.34	8.76	1.06	3.05	8.25
3	8.96	0.36	0.67	35.23	354.73	0.88	4.62	12.73	8.56	1.12	2.85	8.85
4	8.93	0.34	0.61	45.59	286.46	0.9	4.12	22.28	7.22	1.04	4.7	7
5	8.98	0.34	0.37	41.45	314.57	0.8	4.32	18.04	7.28	1.02	3.25	8.15
6	8.93	0.35	0.69	47.66	382.84	0.76	4.4	15.91	8.08	1.08	2.65	8.45
7	9.18	0.37	0.51	49.74	362.76	0.8	4.18	26.52	7.58	1	3.25	8.05
8	9.34	0.35	0.81	37.30	368.12	0.68	3.98	15.91	7.16	0.88	4.5	7.5
9	9.36	0.31	0.58	33.16	357.41	0.54	4.18	14.32	7.44	1.04	3	8.1
10	8.86	0.35	0.62	39.37	366.78	0.66	3.98	24.40	7.52	1.08	4.15	7.75
11	8.81	0.37	0.57	49.74	376.15	0.56	4.26	18.57	8.66	1.14	3.55	8.45
12	7.80	0.33	0.62	43.52	381.50	0.66	4.48	14.32	8.62	1.2	4.5	8.3
13	7.54	0.34	0.56	45.59	242.29	0.8	3.76	19.10	10.36	1.16	2.7	8.5
14	8.78	0.34	0.69	49.74	354.73	0.8	4.4	15.91	11.68	1.18	3	8.6
15	9.25	0.34	0.59	47.66	386.86	0.58	3.98	16.97	7.08	0.94	3.25	7.95
16	8.88	0.36	0.41	39.37	334.65	0.6	3.82	16.97	7.78	1.02	1.45	8.25
17	9.13	0.35	0.63	33.16	382.84	0.66	3.98	18.04	6.6	1.08	2.3	12.5
18	8.86	0.37	0.69	37.30	318.59	0.94	3.76	18.04	7.32	1.08	4.25	7.75
19	8.90	0.38	0.75	29.01	322.60	0.68	4.12	18.04	7.98	1.12	4.9	8.1
20	9.00	0.37	0.62	39.37	408.27	0.56	3.82	20.16	6.7	1.08	3.45	8.15

*=miliequivalent

Soil Fertility Index & Soil Test Rating:-

Samples site:

Village :Ralisana, Taluka: Visnagar, District: Mehsana, Gujarat, India.

Sample No.	pH	EC	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/100 g soil)	Ca (Me*/100 g soil)
L	0	20	2	0	0	0	20	0	0	0	0	0
M	2	0	16	20	3	19	0	15	18	0	1	0
H	18	0	2	0	17	1	0	5	2	20	19	20
%L	0	100	10	0	0	0	100	0	0	0	0	0
%M	10	0	80	100	15	95	0	75	90	0	5	0
%H	90	0	10	0	85	5	0	25	10	100	95	100
S.F.I.*	2.90	1.00	2.00	2.00	2.85	2.05	1.00	2.25	2.10	3.00	2.95	3.00
LMH** of SFI	H	L	M	M	H	M	L	M	M	H	H	H

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

CONCLUSION:- It is concluded from above analysis that E.C. & Fe are in Low Amount, Ferrous Ammonium Sulphate should be added for better plant growth & productivity. The other parameters are in limit. pH is in high limit so it can be neutralized by using acidic fertilizer.

Samples site:

Village :Rajghad, Taluka: Visnagar, District: Mehsana, Gujarat, India.

Sample No.	pH	EC	Org.Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*100 g soil)	Ca (Me*/100 g soil)
1	7.72	0.16	0.70	29.01	457.80	0.52	8.56	17.50	27.12	1.32	2.25	7.45
2	7.52	0.59	0.80	26.94	418.98	0.26	5.88	46.68	17.86	1.26	2.25	6.55
3	7.34	0.31	1.14	29.01	469.85	0.3	8.4	27.58	21.2	1.66	1.95	7.25
4	8.80	0.39	0.63	49.74	159.29	0.26	5.1	38.19	17.74	0.96	2.65	8.35
5	7.75	0.21	0.97	43.52	305.20	0.28	7.52	32.89	24.72	1.2	1.85	7.05
6	7.78	0.20	0.80	29.01	282.44	0.04	8.18	19.63	25.76	1.08	1.9	7.6
7	8.20	0.25	0.60	26.94	202.13	0.02	4.98	16.44	19.28	0.84	1.1	9.5
8	7.94	0.17	0.98	66.32	318.59	0.08	11.52	25.99	16.04	1.28	1.8	8
9	8.10	0.18	1.10	49.74	444.42	0.1	4.98	24.93	16.88	1.1	4.1	9
10	7.54	0.50	0.52	45.59	315.91	0.08	9.16	43.50	23.56	1.28	2.9	8
11	7.86	0.21	0.71	72.53	224.88	0.18	6.72	18.04	26.26	1.2	1.3	8.3
12	7.82	0.17	0.72	43.52	302.52	0.14	5.74	17.50	19.64	1.2	0.9	8
13	7.90	0.61	0.62	82.89	370.79	0.16	6.72	56.23	18.6	1.42	3.6	8.5
14	7.43	0.79	0.87	47.66	273.07	0.28	5.38	40.31	23.24	1.08	3.35	8.55
15	8.31	0.26	0.49	41.45	180.71	0.12	7.52	22.28	19.9	1.22	2.15	9.65
16	7.82	0.15	0.71	70.46	306.54	0.32	9.16	18.04	13.78	1.28	2.5	7.7
17	7.51	0.18	0.83	22.80	291.81	0.26	7.82	27.58	26.62	1.1	3.1	9
18	7.40	0.75	1.05	29.01	258.35	0.54	8.26	28.64	27.76	1.52	1.3	6
19	7.76	0.15	0.60	43.52	322.60	0.28	10.56	17.50	19.24	1.58	2.2	7.5
20	8.60	0.19	1.37	49.74	334.65	0.84	9.08	27.05	17.7	1.32	4.25	7.25

*=miliequivalent

Soil Fertility Index:

Samples site & Soil Test Rating:-

Village :Rajghad, Taluka: Visnagar, District: Mehsana, Gujarat, India.

Sample No.	pH	EC	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*100 g soil)	Ca (Me*/100 g soil)
L	0	20	1	1	0	17	2	0	0	0	1	0
M	17	0	9	15	8	3	16	7	0	0	7	0
H	3	0	10	4	12	0	2	13	20	20	12	20
%L	0	100	5	5	0	85	10	0	0	0	5	0
%M	85	0	45	75	40	15	80	35	0	0	35	0
%H	15	0	50	20	60	0	10	65	100	100	60	100
S.F.I.*	2.15	1.00	2.45	2.15	2.60	1.15	2.00	2.65	3.00	3.00	2.55	3.00
LMH** of SFI	M	L	H	M	H	L	M	H	H	H	H	H

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

CONCLUSION:- It is concluded from above analysis that E.C. & Zn are in Low Amount, Zinc Sulphate should be added for better plant growth & productivity. The other parameters are in limit. pH is in medium limit so it can be neutralized by using acidic fertilizer.

Samples site:

Village :Rampura, Taluka: Visnagar, District: Mehsana, Gujarat, India.

Sample No.	pH	EC	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/100 g soil)	Ca (Me*/100 g soil)
1	8.05	1.00	0.91	29.01	325.28	0.58	4.24	79.57	15.74	1.24	4.3	10.8
2	9.00	0.36	0.82	47.66	258.35	0.28	4.32	132.61	9.2	0.86	2.25	5.95
3	8.63	0.34	0.83	31.09	270.40	0.28	4.6	32.89	10.74	0.84	1.9	6.6
4	8.71	1.13	0.89	26.94	198.11	0.5	3.74	22.81	5.94	0.54	0.85	7.55
5	8.44	1.00	0.91	24.87	163.31	0.48	3.6	94.42	10.6	0.54	3.9	7.2
6	9.00	0.63	0.82	20.72	191.42	1.96	4.14	95.48	9.08	0.7	2.45	6.95
7	8.45	1.00	0.91	29.01	250.32	0.54	3.56	91.77	12.42	0.64	2.85	6.25
8	9.09	0.89	0.70	22.8	208.82	0.34	4.14	95.48	9.12	0.82	2	5.6
9	9.03	0.51	0.72	29.01	163.31	0.74	3.46	32.36	10.36	0.56	2.45	5.95
10	8.17	0.50	0.89	64.24	314.57	0.34	3.64	41.37	8.52	0.56	2.75	5.65
11	8.31	1.00	0.70	31.09	137.88	0.36	3.02	33.42	18.18	0.56	3.45	9.65
12	8.27	1.00	0.91	26.94	165.99	0.52	3.46	100.78	19.52	0.68	4.2	10.4
13	8.85	0.69	0.73	29.01	187.40	0.24	3.74	103.44	7.36	0.44	3	7.7
14	9.20	0.60	0.89	22.8	133.86	0.32	3.92	63.65	7.8	0.64	3.45	4.95
15	8.80	1.20	0.90	26.94	220.87	0.44	3.64	40.31	8.66	0.58	3.2	7.9
16	8.40	1.00	0.91	24.87	170.00	1.98	3.92	74.79	10.94	0.94	2.95	11.15
17	8.65	1.78	0.83	49.74	204.81	0.72	3.64	68.96	7.98	0.64	2.35	7.25
18	8.35	0.84	0.77	31.09	194.10	0.46	3.88	68.43	8.36	0.7	3.75	5.95
19	8.80	0.68	0.56	26.94	223.55	0.92	3.68	65.24	6.9	0.62	9.05	7.05
20	8.68	0.51	0.77	24.87	216.85	0.28	3.32	32.36	10.3	0.58	3.35	5.85

*=miliequivalent

Samples site & Soil Test Rating:-

Village :Rampura, Taluka: Visnagar, District: Mehsana, Gujarat, India.

Sample No.	pH	EC	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*100 g soil)	Ca (Me*/100 g soil)
L	0	11	0	6	2	11	20	0	0	0	1	0
M	2	9	5	13	16	7	0	0	11	0	2	0
H	18	0	15	1	2	2	0	20	9	20	17	20
%L	0	55	0	30	10	55	100	0	0	0	5	0
%M	10	45	25	65	80	35	0	0	55	0	10	0
%H	90	0	75	5	10	10	0	100	45	100	85	100
S.F.I.*	2.90	1.45	2.75	1.75	2.00	1.55	1.00	3.00	2.45	3.00	2.80	3.00
LMH** of SFI	H	L	H	M	M	L	L	H	H	H	H	H

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

CONCLUSION:- It is concluded from above analysis that E.C. & Zn & Fe are in low amount, Zinc Sulphate & Ferrous Ammonium Sulphate should be added for better plant growth & productivity. The other parameters are in limit. pH is in high limit so it can be neutralized by using acidic fertilizer.

Samples site:

Village : Umta, Taluka: Visnagar, District: Mehsana, Gujarat, India.

Sample No.	pH	EC	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/100 g soil)	Ca (Me*/100 g soil)
1	7.70	0.26	0.97	29.01	238.27	0.32	4.86	39.78	15.78	1.04	3.10	7.7
2	7.67	0.24	0.78	82.89	307.88	0.38	4.58	18.57	20.5	1.18	3.15	8.65
3	7.86	0.20	0.97	64.24	365.44	0.34	4.44	22.81	17.96	1.12	3.10	9
4	7.75	0.67	1.03	31.09	372.13	0.14	4.36	48.27	23.3	1.12	2.60	8.1
5	7.45	0.23	0.65	24.87	178.03	0.8	5.36	22.81	24.36	1.4	3.75	9.55
6	8.70	0.33	0.57	29.01	329.30	0.28	4.22	30.77	23.14	0.88	2.00	8.3
7	7.18	0.35	0.91	47.66	469.85	0.52	5.74	53.04	29.34	1.28	2.20	6.9
8	7.71	0.22	0.88	82.89	277.09	0.2	4.4	30.77	22.88	0.88	2.80	7
9	7.23	0.35	1.10	43.52	465.83	0.42	6.32	71.08	29.06	1.12	1.35	6.45
10	7.18	0.24	0.53	49.74	397.56	0.22	6.42	14.85	29.86	1.56	2.60	7.5
11	7.63	0.30	1.14	29.01	263.70	0.48	5.5	22.28	3.42	0.9	2.60	7.3
12	7.42	0.83	0.97	22.80	248.98	0.52	5.14	45.09	18.64	1.08	2.80	7.1
13	7.71	0.28	1.14	31.09	254.33	0.62	5.5	22.28	21.42	1.04	1.50	10.3
14	7.58	0.34	0.56	26.94	282.44	0.4	4.54	23.34	16.32	1.16	4.35	5.05
15	7.78	0.23	0.80	84.97	342.68	0.16	3.96	30.77	12.48	0.88	1.45	10.15
16	7.63	0.20	0.52	41.45	227.56	0.14	5.22	23.87	15.9	1.06	1.45	8.65
17	7.29	0.25	0.72	26.94	269.06	0.22	5.6	30.24	28.1	1.1	1.10	7.6
18	7.71	0.26	0.74	93.26	250.32	0.34	5.22	25.46	27.24	1.06	3.55	9.45
19	7.77	0.55	0.91	49.74	275.75	0.3	4.22	61.53	24.24	0.72	4.20	8.2
20	7.56	0.28	0.76	26.94	297.17	0.46	5.04	19.63	24.02	1.28	2.05	10.05

*=miliequivalent

Soil Fertility Index & Soil Test Rating:-

Samples site:

Village : Umta , Taluka: Visnagar, District: Mehsana, Gujarat, India.

Sample No.	pH	EC	Org. Carbon (%)	Phosphorous (Kg/ Hectare)	Pottash (Kg/Hectare)	Zn ppm	Fe ppm	Sulphur ppm	Mn ppm	Cu ppm	Mg (Me*/100 g soil)	Ca (Me*/100 g soil)
L	0	20	0	0	0	20	0	0	1	0	0	0
M	19	0	7	0	0	0	0	0	0	0	6	0
H	1	0	13	20	20	0	20	20	19	20	14	20
%L	0	100	0	0	0	100	0	0	5	0	0	0
%M	95	0	35	0	0	0	0	0	0	0	30	0
%H	5	0	65	100	100	0	100	100	95	100	70	100
S.F.I.*	2.05	1.00	2.65	3.00	3.00	1.00	3.00	3.00	2.90	3.00	2.70	3.00
LMH** of SFI	M	L	H	H	H	L	H	H	H	H	H	H

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

CONCLUSION:- It is concluded from above analysis that E.C. & Zn are in low amount, Zinc Sulphate should be added for better plant growth & productivity. The other parameters are in limit. pH is in medium limit so it can be neutralized by using acidic fertilizer.

REFERENCES:

1) Lal R. J. Sustain. Agric., 1,67-92., 1991

2) Granatstein D, Bezdicek DF. Amer. J. Alter. Agric. 7:12-16., 1992

3) Sanders DW. J. Alter. Agric. 7:17-24., 1992

4) Karlen DL, Eash DS, Unger PW. Amer. J. Alter. Agric. 7:48-55., 1992

5) Papendick RI, Parr JF. Amer. J. Alter. Agric. 7:2-3. , 1992

6) Acton DF, Padbury GA. Centre for Land and Biological Resources Research, No. 93-49, 1993

7) Doran JW, Parkin TB, Soil Sci. Soc. Amer., Madison, Wisconsin., 1994