Sediments characteristics of villages adjacent to Sabarmati River

C. G. Patel[*], S. A. Makwana and H. D. Jahangirpuria

K. K. Shah Jarodwala Maninagar Science College, India

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ABSTRACT

Soil analysis is a chemical processes that determine the amount of available plant nutrients in the soil & by determining the parameter we are able to achieve good soil health[2].We have collected 20 soil samples of various villages adjacent to Sabarmati river according to standard method suggested by literature & analyzed in our laboratory. We have determined primary nutrients nitrogen (N), phosphorus (P), potassium (K), OC(Organic Carbon) ,pH, EC, & macro nutrient like Ca Mg, , S, & micronutrients like Cu, Fe, Mn, Zn of all the samples & seen a significant variation[04].

Keywords: Soil, Sabarmati, Fertilizer, EDTA, Buffer

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INTRODUCTION

Soil analysis can be done by collecting soil samples than laboratory analysis of samples the interpretation of the results by the issuance of fertilizer recommendation[1]. Good crop production often requires the application of lime and fertilizer. Soil testing enables you to find out how much lime and fertilizer you need to apply. Main focus of our analysis is on pH levels of soil, amount of the principal nutrients, type and quantity of lime your soil needs, Nutrients need to be added to your soil as fertilizer [09].Finally we can have idea of amount of fertilizer your crop and soil needs.

MATERIALS AND METHODS

We have collected 20 soil samples of villages adjacent to Sabarmati river & analyzed in our laboratory. After collecting samples all the samples are dried by Oven after complete drying samples are crushed manually then converted into powder form. 10 gm. of each sample taken in 20 ml double distilled water to allow into mechanical shaker about 30 min. to make a proper solution. Then all the samples are filtered & used for analysis.

Following methods are used for analysis.
1 Determination of pH: By using pH meter. The range of is found between 6.9 to 8.2

2. Determination of EC: By using conductometer EC was recorded. It is found between 0.8 to 1.3

3. Determination of OC: 1 gm soil sample + 10 ml 0.1 N $K_2Cr_2O_7$ + 20 ml Conc.H_2SO_4 + 20 ml distilled water taken in Borosilicate 100 ml beaker & allowed overnight for reaction & determined OC by Spectrophotometer (Red Filter 660 nm).

% O.D is calculated from following equation

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% O.D. = O.D. x G.F.x 100/ wt.of soil (1 gm)

	Element :	Cu	Fe	Mn	Zn
1	Wavelength :	324.9 nm	248.5 nm	279.9 nm	214.0 nm
2	Slit :	0.6 nm	0.6 nm	0.6 nm	0.7 nm
3	Current :	6.4 mA	11 mA	09.9 mA	10.5 mA
4	EHT :	490 V	735 V	735 V	690 V
5	Int.Time :	1 Sec	1 Sec	1 Sec	01.00 Sec
6	BGC :	OFF	OFF	OFF	OFF
7	Burner :	Air-Acetylene	Air-Acetylene	Air-Acetylene	Air-Acetylene
8	Flame :	Lean'	Lean'	Lean'	Stoichiometric'

4. Determination of N: Nitrogen is calculated from following equation

N= O.C. X 0.0862

5. Determination of P:2 gm soil sample + 40 ml Sodium Bicarbonate(pH=8.5) + 1 gm activated charcoal & allowed to stir in mechanical shaker for 30 minutes than it was filtered. After filtration 5 ml filtrate + 1 ml $SnCl_2$+5 ml 1.5%$(NH4)_2$ MoO_4 & distilled water is added to make 25 ml solution & by using this solution on Spectrophotometer (Red Filter 660 nm) Phosphorus is measured.

P is calculated from following equation

P = O.D.x G.F.

6. Determination of K:25 ml Ammonium acetate is added to 5 gm soil sample & allowed to stir for 5 minutes & after filtration than by using flame photometer K is determined easily.

K is calculated from following equation.

K= G.F. x reading from flame photo meter in ppm.

7. Determination of Ca & Mg : 25 ml Ammonium acetate is added to 5 gm soil sample & allowed to stir for 5 minutes & after filtration 5 ml sample + 5 ml double distilled water + 3 ml Buffer solution (pH =10) and 1-2 drop of E.B.T.as indicator & titrated against 0.01 M EDTA solution total amount of Ca& Mg is determined.i.e A gmThan 5 ml soil sample + 5 ml d.water + 2 ml 4N NaOH & Muroxide is added as indicator & titrated against 0.01 M EDTA solution giving amount of Ca.i.e B gm. Therefore amount of Mg = A- B = C gm is determined.

8. Determination of S: 10 gm of air dried sample of soil + 25 ml of 0.15 % $CaCl_2$ Solution & this mixture is allowed on mechanical shaker for 30 minutes. Than this solution is filtered by whatman filter paper no.1.After that 5 ml filtrate solution + 5 ml buffer + 1 gm $BaCl_2$ + 1 ml gum aceshiya solution taken in taken in 25 ml volumetric flask & distilled water is added upto mark to make 25 ml solution of each sample.[5]

Calibrated Colorimeter (Blue filter) is used to find out amount of S in each sample.

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9. Determination of micro nutrients (Fe,Cu,Zn,Mn) : All these micro nutrients are measured by AAS method using following Holo cathode lamp[10]

Sr.	Element	Unit	Critical Limit		
			low	medium	high
1	S	ppm	<10	10-20	>20
2	Fe	ppm	<5	5-10	>10
3	Mn	ppm	<5	5-10	>10
4	Zn	ppm	<0.5	0.5-1.0	>1.0
5	Cu	ppm	<0.2	0.2-0.4	>0.4
6	Ca	ppm	<1.5	1.5-3.0	>3.0
7	Mg	ppm	<1.0	1.0-2.0	>2.0

All the results are represented in following tabular form.

Sr.	Name of Village	PH	E.C.	O.C	N	P	K	Cu ppm.	Fe ppm.	Mn ppm.	Zn ppm.	S ppm.	Ca ppm.	Mg ppm.
1	Nana Chiloda	7.81	0.98	0.639	0.056	49.5	999.8	1.52	0.69	5.73	0.33	3.572	1.0	1.8
2	Karai	7.69	0.77	0.389	0.034	51.3	466.6	1.83	0.63	6.43	0.39	3.23	0.9	2.3
3	Koba	7.82	0.8	0.576	0.050	42.3	863.5	1.87	0.7	6.92	0.51	3.306	0.91	2.19
4	Valad	7.64	0.68	0.608	0.053	42.3	863.5	2.78	0.98	6.64	0.39	3.42	0.65	2.34
5	Basan	7.79	0.65	0.514	0.045	46.8	838.3	2.13	0.33	6.07	0.76	3.268	0.85	1.65
6	Lekhavada	7.67	0.55	0.670	0.058	48.6	983.2	2.06	0.55	6.11	3.69	3.154	0.83	1.95
7	Dolarana	7.67	0.97	0.389	0.034	52.2	718.6	1.54	0.42	2.56	0.23	2.964	0.92	2.13
8	Sadra	7.67	0.63	0.420	0.037	49.5	895	1.57	0.46	1.77	0.12	3.306	0.86	1.84
9	Amarapur	7.45	0.59	0.514	0.045	46.8	976.9	1.66	0.44	3.81	0.27	3.382	0.9	2.4
10	Palaj	7.51	0.8	0.514	0.045	42.3	850.9	1.63	0.51	4.49	0.29	3.116	1.2	1.75
11	Ambod	7.67	0.83	0.639	0.056	46.8	756.4	1.8	0.55	6.47	0.31	3.572	1.4	1.45
12	Aluva	7.43	1.3	0.576	0.050	39.6	567.4	1.7	0.3	5.8	0.67	3.116	1.5	1.45
13	Mahudi	7.32	1.02	0.576	0.050	42.3	762.7	1.8	0.6	6.25	4.17	3.04	1.22	1.35
14	Fudeda	7.34	0.98	0.639	0.056	12.75	819.4	1.86	0.39	5.0	0.49	2.014	0.8	2.06
15	Jorapur	7.42	1.02	0.608	0.053	48.75	195.7	1.9	0.65	6.32	0.23	2.736	1.31	2.99
16	Aaglod	7.21	0.66	0.138	0.012	46.05	850.9	1.63	0.59	6.61	4.5	3.192	1.1	1.95
17	Valasna	7.37	0.32	0.607	0.014	7.35	661.9	1.6	0.43	4.18	0.37	3.04	0.63	1.02
18	Undani	7.91	0.54	0.357	0.031	8.25	391	1.44	0.42	2.05	0.12	3.002	1.13	1.72
19	Chandap	7.78	0.7	0.295	0.026	10.05	290.2	1.77	0.37	5.21	0.43	2.812	0.75	1.9
20	Eklara	7.77	0.47	0.357	0.031	11.85	359.5	1.9	0.3	5.33	0.41	3.154	0.76	2.09

RESULTS AND DISCUSSION

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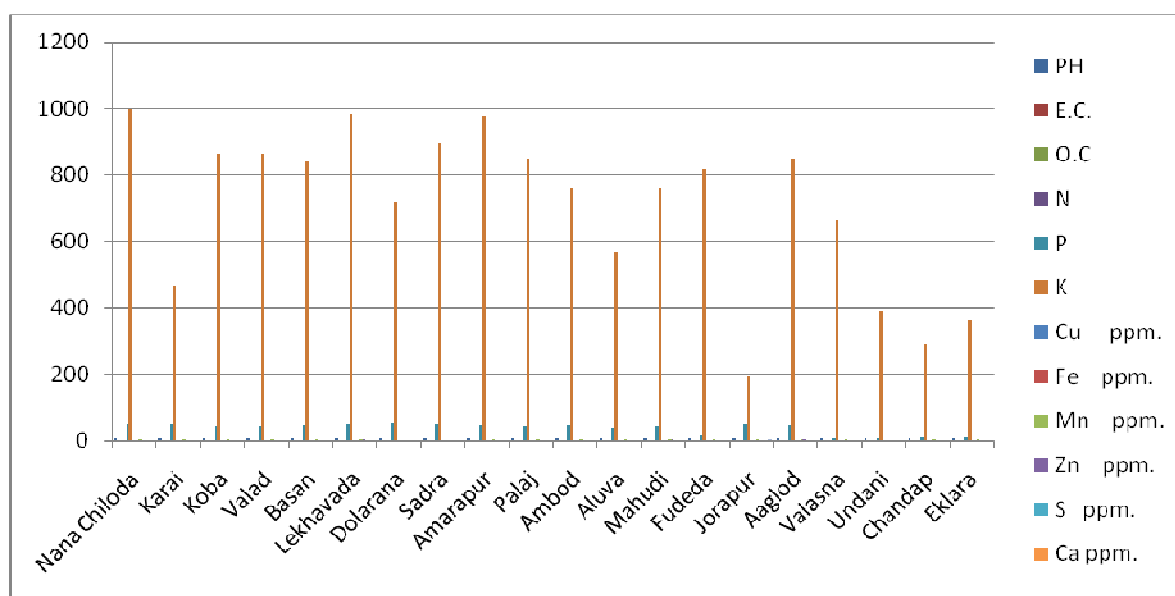
Analysis of pH : The range of pH of all samples found between 6.9- 7.91 . Palag is found 6.9 with least pH of & Undani village found highest pH of 7.91.Soil of Undani vilaage is found quite basic in nature.[3]

Analysis of E.C.: The range of E.C of all samples found between 0.32 – 1.3 . Valsana village is found 0.32 with least E.C of & Aluva village found highest E.C of 1.3[3]

Analysis of O.C.: The range of O.C of all samples found between 0.138 – 0.670 .Aaglod village is found with least O.C of 0.138 & Lekhavada village found highest O.C of 0.670

Analysis of N : The range of N of all samples found between 0.012 – 0.058. Aaglod village is found with least N of 0.012 & Lekhavada village found highest N of 0.058 .Aaglod type soil is required to use Urea fertilizer to overcome the deficiency of nitrogen.

Analysis of P : The range of P of all samples found between 7.35 – 52.2 . Valsana village is Valasna found with least P of 7.35 & Dolarana village found highest P of 52.2 type soil is required to use Ammonium phosphate (NPK) fertilizer to overcome the deficiency of Phosphorus

Analysis of K : The range of K of all samples found between 195.7 – 999.8 . Jorapur village is found with least K of 195.7 & Nana Chiloda village found highest K of 999.8 Jorapur type soil is required to use NPK fertilizer to overcome the deficiency of Phosphorus

Analysis of Cu : The range of Cu of all samples found between 1.44 - 2.78 ppm. Undani village is found with least Cu of 1.44 ppm & Valad village found highest Cu of 2.78 ppm

Analysis of Fe : The range of Fe of all samples found between 0.3 - 0.98 ppm. Eklara village Is found with least Fe of 0.3 ppm & Valad village found highest Fe of 0.98 ppm

Analysis of Mn: The range of Mn of all samples found between 1.77 – 6.92 ppm . Sadara village is found with least Mn of 1.77 ppm & Koba village found highest Mn of 6.92 ppm

Analysis of Zn : The range of Zn of all samples found between 0.12 – 4.5 ppm. Sadara village is found with least Zn of 0.12 ppm & Aaglod village found highest Zn of 4.5 ppm

Analysis of S : The range of S of all samples found between 2.014 – 3.572 ppm. Fudeda village is found with least S of 2.014 ppm & Nana chiloda village found highest S of 3.572 ppm
Analysis of Ca : The range of Ca of all samples found between 0.63 – 1.5 ppm . Valsana village is found with least Ca of 0.63 ppm & Aluva village found highest Ca of 1.5 ppm[6]

Analysis of Mg : The range of Mg of all samples found between 1.02 – 2.99 ppm. Valsana village is found with least Mg of 1.02 ppm & Aluva village found highest Mg of 2.99 ppm

CONCLUSION

By taking reference of this type of analysis farmer can have idea of purity contents of their soil & keeping mind these data they have to use fertilizers accordingly.

REFERENCES

[1]Hole, D.G., Perkins, A.J., Wilson, J.D., Alexander, I.H., Grice, P.V. and Evans, A.D.*Biological Conservation*, 122 (1); 113-130 (**2005**).
[2]Subbiah, B.V. and Asija, G.L. *Current Science,* 25; 259-260 (**1956**).

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[3]Production Agriculture 6[4]: 483-486 (**2002**)

[4]Bodruzzaman, M., Sadat M.A., Meisner, C.A., Hossain, A.B.S. and Khan, H.H. Direct and residual effects of applied organic manure on yields in a wheat-rice cropping pattern. Paper No. 781. 17th World Congress of Soil Science 14th-21[st]August, **2002,** Bankok, Thailand.

[5]Gomez KA and Gomez AA. Statistical Procedure for Agricultural Research. John Wiley and sons, New York,(**1984**)

[6]Walkley, A. and Black C.A. (**1934**) *Soil Sci.* 37 (1): 29-38.

[7]Subbiah, B.V. and G.L. Asija (**1956**) *Current (***25**): 259-260.

[8]Ali. M.A, Baugh. P.J, *International Journal of Environment Analytical chemistry*, , 83 (11) 922-933. (**2003**)

[9]Kin-Che, L., Leung Y. F. and Yao, Q., Nutrient fluxes in the Shenchong Basin, Deqing County, South China, Catena, 29, 191-210 (**1997**).

[10] Dr.Dalwadi M.R. ,dr. Bhatt V.R. Soil & water testing ,Anand, Gujarat ,India **2008**