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Physico-chemical Studies of Soil Samples of Tribal Area Surrounding Dahod, Gujarat, India

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Dahod is a district place, situated at the boarder of three states Gujarat, Madhya Pradesh and Rajasthan, India. The soil samples from 10 different villages of tribal area surrounding Dahod were collected. The physico-chemical properties such as moisture content, specific gravity, pH measurement and estimations of Mg^{2+}, Na^{+}, K^{+} and Cl^{-}, HCO_3^{-}, PO_4^{3-}, NO_3^{-} % of carbon were studied.

Key Words: Soil samples, Tribal area, Dahod.

INTRODUCTION

Ten villages Chhapari, Chosala, Sakarda, Zalod, Limkheda, Raibar, Chandwana, Limdi, Lilar, Pipali were chosan as the sample collection centres. The soil samples were collected from three different deepness. Total 90 samples with three deepness *i.e.* 8'', 1', 3' were collected. It has been found the samples from three-feet deepness were rather difficult to achieve as were rocky or stony soil. The physico-chemical properties[1-4] of soil samples were studied as (1) miosture content determination (2) specific gravity determination (3) pH-study (4) the chemical properties of soil samples were studied as follows.

The cations were studied as estimation of magnesium, estimation of % exchangeable, sodium, potassium. The anions were studied as estimations of chloride, bicarbonate, phosphate, nitrate. The organic carbon % showing the fertility of soil was also studied. K_2O (potash) kg/hec was also studied by standard methods.

EXPERIMENTAL

The moisture content is the ratio of the weight of water to the weight of the solids in a given mass of soil. This ratio is expressed as percentage.

The specific gravity is the ratio of the weight in air of the given volume of dry soil solids at a stated temperature to the weight in air of an equal volume of distilled water at a stated temperature were studied by standard methods.

Chemical characteristics:

Preparation of soil extract: The soil samples were crushed by wooden pestle and mortar and were kept in oven at 80 °C for 24 h. The soil samples were passed through 1 mm sieve. These soil samples and distilled water were mixed in 1:5 ratio

and kept for 2 to 3 h. The soil solution was filtered through Whatmann No. 1 filter paper. This filterate was treated as the soil extract for following analysis.

pH study: The pH meter was standardized using the known buffer (pH = 4.0) and the pH measurement of soil extract was taken directly by dipping the electrodes to the extract.

Results of chemical analysis of extract reveal large amount of soluble salts. Incorporation of high amounts of cations (Na^+, K^+, Mg^{2+}) and anions (Cl^-, HCO_3^-, NO_3^-, CO_3^{2-}, PO_4^{3-}) in solid causes increase in conductivity of the soil sample[5].

RESULTS AND DISCUSSION

The total organic carbon and potash contents are given in Table-1. The physico-chemical data and the amount of cations and anions are presented in Table-2.

TABLE-1
SHOWING THE FERTILITY STATUS OF SOIL

Sample station	Organic carbon & showing the fertility of soil total % carbon			Available nutrients Kg/hec K_2O (Potash) Kg/hec		
	8"	1'	3'	8"	1'	3'
Chhapari	0.42	0.43	0.46	330	280	390
Chosala	0.06	0.27	0.39	380	400	410
Sakarda	0.21	0.33	0.42	430	440	442
Zalod	0.18	0.39	0.42	300	360	370
Limkheda	0.18	0.33	0.39	430	440	440
Raibar	0.09	0.39	0.39	300	320	322
Chandwana	0.06	0.27	0.21	325	330	330
Limdi	0.27	0.33	0.39	300	310	310
Lilar	0.39	0.42	0.42	380	380	382
Pipali	0.63	0.87	1.05	395	300	310

Temperature and pH study: In the present study temperature ranged from 29.0 to 34.5 ºC. The soils of the villages are found to be slightly alkaline[6] in nature.

Moisture content: The moisture content were found from 8.18 to 18.12 % at the level 8" while 7.70 to 17.60 % and 6.46 to 15.20 % from the deepness of 1' and 3' feet, respectively.

Specific gravity: The specific gravity of soil samples analyses were falling in between the range 1.16 to 2.33. The specific gravity of the soil particles lie within the range 2.65 to 2.85 soils containing organic matter and porous particles may have specific gravity values below 2.0 soils having heavy substance may have values above 3.0.

Total % carbon: Organic carbon 7-9 % showing the fertility of the soil[7-9].

In the present study % carbon is ranged from 0.06 to 0.87 %.

Magnesium: Magnesium ranged from 1.5 to 4.4 meq/L found during study.

TABLE-2
PHYSICO-CHEMICAL ANALYSIS OF SOIL ANALYSIS OF THE SAMPLE COLLECTED IN JUNE/JULY 2001

Sample	Temp. (ºC)	pH			Moisture content (%)			Specific gravity			Cations meq/L								
											Mg^{2+}			Na^{+}			K^{+}		
		8''	1'	3'	8''	1'	3'	8''	1'	3'	8''	1'	3'	8''	1'	3'	8''	1'	3'
Chhapari	34.0	7.95	7.65	7.40	18.12	17.60	15.20	1.53	1.50	1.56	2.3	2.7	3.2	3.3	3.2	3.7	0.25	0.24	0.28
Chosala	34.5	8.01	8.21	8.33	10.60	8.93	8.34	1.72	1.57	1.16	2.0	2.6	3.2	3.8	4.0	4.1	0.27	0.28	0.27
Sakarda	32.0	8.14	8.12	8.18	14.76	12.97	12.10	2.33	2.22	2.11	1.7	2.1	3.2	4.5	4.4	4.4	0.30	0.27	0.30
Zalod	32.0	8.13	8.08	8.01	14.06	13.37	12.52	2.19	1.99	1.55	1.5	1.8	2.1	3.0	3.6	3.7	0.23	0.27	0.24
Limkheda	29.5	8.21	7.94	8.15	12.10	10.80	10.20	1.50	1.46	1.40	1.9	2.4	3.9	4.4	4.5	4.4	0.30	0.31	0.30
Raibar	32.5	8.12	7.97	7.82	10.44	9.48	9.22	1.98	1.89	1.86	2.2	1.9	3.6	3.6	3.2	3.1	0.23	0.24	0.26
Chandwana	29.0	7.96	7.61	8.16	8.40	8.01	7.90	1.68	1.60	1.64	1.7	2.2	3.4	3.2	3.4	3.3	0.26	0.25	0.24
Limdi	34.0	8.17	8.13	7.97	8.18	7.70	6.46	1.96	1.85	1.73	2.4	4.2	4.2	3.2	3.1	3.1	0.23	0.26	0.26
Lilar	32.5	7.41	7.70	8.20	8.57	7.91	6.62	1.97	1.89	1.60	2.1	2.2	4.4	3.8	3.8	3.9	0.28	0.28	0.26
Pipali	32.0	7.92	7.97	8.23	10.30	9.47	9.40	1.90	1.88	1.71	1.7	1.9	2.2	2.9	3.0	3.0	0.24	0.26	0.26

Sample	Temp. (ºC)	Anions (meq/L)									mg/L					
		Cl^{-}			CO_3^{2-}			HCO_3^{-}			NO_3^{-}			PO_4^{3-}		
		8''	1'	3'	8''	1'	3'	8''	1'	3'	8''	1'	3'	8''	1'	3'
Chhapari	34.0	5.8	5.1	4.9	4.2	4.9	5.4	2.1	3.3	3.3	5.1	4.9	3.4	0.40	0.42	0.46
Chosala	34.5	5.4	4.8	4.9	4.2	5.4	5.5	2.4	3.5	3.7	5.5	4.9	4.7	0.26	0.30	0.38
Sakarda	32.0	6.1	5.3	5.7	6.4	7.8	8.3	2.7	3.1	3.1	5.4	3.6	3.2	0.26	0.34	0.42
Zalod	32.0	6.1	4.5	4.5	8.0	8.1	7.9	2.5	3.2	3.3	4.8	5.1	4.7	0.40	0.43	0.52
Limkheda	29.5	5.4	6.2	4.8	7.2	7.4	8.9	3.0	3.1	3.1	4.9	4.8	3.6	0.26	0.34	0.38
Raibar	32.5	6.1	5.2	4.9	7.9	5.2	5.4	2.4	3.5	3.7	5.8	4.9	4.9	0.38	0.42	0.42
Chandwana	29.0	6.8	5.3	5.9	7.6	8.1	8.6	2.9	3.3	3.3	1.2	4.8	4.6	0.30	0.34	0.52
Limdi	34.0	5.4	6.2	4.8	7.1	5.9	6.8	2.1	2.4	3.2	7.2	3.7	3.6	0.27	0.36	0.42
Lilar	32.5	5.9	5.5	4.8	7.4	8.2	8.4	2.4	3.1	3.1	3.7	2.7	3.4	0.68	0.63	0.80
Pipali	32.0	5.7	5.2	4.7	5.4	5.9	7.2	2.3	3.3	3.4	3.7	3.4	4.0	0.42	0.52	0.52

Sodium and potassium: Sodium ranged form 3.00 to 4.50 meq/L and potassium ranged from 0.25 to 0.31 meq/L.

Chloride: Chloride[10] was found from 0.30 to 1.60 meq/L during present study.

Carbonate, bicarbonate: Carbonate 5.20 to 8.90 meq/L while bicarbonate ranged from 2.10 to 3.70 meq/L.

Nitrate and phosphate: The range of nitrate was from 3.2 to 5.5 while it was for phosphate 0.26 to 0.80 mg/L.

K_2O (potash) determination: In the present study the K_2O (potash) ranged from 300 to 442 kg/hec is determined.

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