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Physico-Chemical Characteristics of Soils of Dahegam Taluka, Gujarat

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Abstract

This communication deals with quality of soil of Dahegam Taluka. Soil samples were collected from forty different villages of Dahegam Taluka. Quality characteristics of soil such as pH, Electrical Conductivity (EC), Calcium (Ca^{2+}), Magnesium (Mg^{2+}), Bicarbonate (HCO_3^-), Chloride (Cl^-), Total Organic Carbon, Available Nitrogen (N), Available Phosphorus (P_2O_5) and Available Potassium (K_2O) were determined as per standard methods. Results show that 20% soils are deficient in organic carbon whereas 95% soils are deficient in available potassium.

Key words: Quality of soil, Dahegam, Gujarat

Introduction

Soil is important to everyone either directly or indirectly. It is the natural bodies on which agricultural products grow and it has fragile ecosystem¹. The fertility of the soil depends on the concentration of N, P, K, organic and inorganic materials and water. Nitrogen is required for growth of plant and is a constituent of chlorophyll, plant protein, and nucleic acids. Phosphorus is most often limiting nutrients remains present in plant cell nuclei and act as energy storage. It helps in transfer of energy. Potassium is found in its mineral form and affect plant cell division, carbohydrate formation, translocation of sugar, various enzyme actions and resistance to certain plant disease, over

60 enzymes are known to require potassium for activation².

Amount of nutrients to be added to soil for crop production depend on their present amount in that soil. Fertilizer addition is recommended, now a day on STR (Soil Test Recommendation) basis in which contents of major nutrients (N, P, K) are determined following standard methods before sowing. Their values suggest quality of soil in terms of its nutrients contents i.e. high, medium or low nutrients. These nutrients content are than deduced from required amount of nutrients for following crop and this much amount of nutrients is now recommended for addition to soil.²

Table 1. Villages of Dahegam Taluka selected for soil sampling

North Region	South Region	East Region	West Region
Vasna Chaudhary	Bardoli	Palundra	Chiskari
Vadod	Harsoli	Sanoda	Bariya
Cekhlapagi	Kadadara	Nandol	Muvada
Patnakuva	Karoli	Ahmadpur	Kadjodra
Dharisana	Zak	Salki	Mahudiya
Halisa	Hilol	Vardhana Muvada	Najupura
Rakhiyal	Kanipur	Jalundra Mota	Vaghajipur
Sahebjina Muvada	Bahiyel	Palaiya	Fuljina Muvada
Kalyanjina Muvada	Hathijan	Shiyavada	Jindva
Vadvasa	Ghamij	Dahegam	Piplaj

Table 2. Methods used for quality analysis of soil samples

Quality characteristics	Method used
pH	Measured by pH meter
Electrical Conductivity (EC)	Recorded by conductivity meter
Ca ²⁺	EDTA titration
Mg ²⁺	EDTA titration
HCO ₃ ⁻	Neutralizing with standard HCl
Cl ⁻	Mohr's method
Total Organic Carbon	Titrated with an excess of K ₂ Cr ₂ O ₇
Available Nitrogen (N)	Kjeldal method
Available Phosphorus (P ₂ O ₅)	Olsen's method (Spectrophotometric)
Available Potassium (K ₂ O)	Flame photometer.

Table 3. Physico-chemical characteristics of soil of Dahegam Taluka

Soil quality characteristics	Experimental value (Range)	Mean	SD	% CV
pH	6.62-7.69	7.10	0.33	4.70
EC	0.002-0.62	0.10	0.052	52.0
Organic carbon	0.27-1.79	0.77	0.33	43.08
Available nitrogen	107.52-5447.68	2083.43	1196.27	57.41
C/N	4.3-93.75	12.19	15.00	123.02
Available phosphorus (P ₂ O ₅)	128.5-5899	1620.79	1317.28	81.27
Available potassium (K ₂ O)	2.43-186.19	50.83	53.75	105.73
Na ⁺	5.3-98.3	37.32	27.01	72.37
Ca ²⁺	0.0064-0.048	0.024	0.027	110.21
Mg ²⁺	1.55x10 ⁻³ -27.22x10 ⁻³	13.00x10 ⁻³	0.006	46.15
Cl ⁻	0.013-0.13	0.055	0.066	121.41
HCO ₃ ⁻	0.0-0.488	0.16	0.21	128.77

N = 40; Unit of all characteristics are in % except pH and EC (mScm⁻¹); SD = standard deviation; CV = coefficient of variance

Table 4. Classification of soil quality of Dahegam Taluka

Quality characteristics	Unit	Standard value (Range)	Category of soil	No. of villages
pH	-	Upto 4.50	Extremely acidic	0.0
		4.51-5.00	Very strongly acidic	0.0
		5.01-5.50	Strongly acidic	0.0
		5.51-6.00	Moderately acidic	0.0
		6.01-6.50	Slightly acidic	0.0
		6.51-7.30	Neutral	34 .0
		7.31-7.80	Slightly alkaline	6.0
		7.81-8.50	Moderately alkaline	0.0
		8.51-9.00	Strongly alkaline	0.0
		Above 9.00	Very strongly alkaline	0.0
Electrical Conductivity (Salinity)	mS/cm	Upto 1.00	Average	40.0
		1.01-2.00	Harmful to germination	0.0
		2.01-3.00	Harmful to crop	0.0
Organic Carbon	%	Upto 0.20	Very less	0.0
		0.21-0.40	Less	2.0
		0.41 -0.50	Medium	6.0
		0.51-0.80	On an average sufficient	17.0
		0.81-1.00	Sufficient	7.0
		Above 1.00	More than sufficient	8.0
Available Nitrogen (N)	kg/ha	Upto 50	Very less	0.0
		51-100	Less	0.0
		101-150	Good	1.0
		151-300	Better	0.0
		Above 300	Sufficient	39.0
Available Phosphorus (P ₂ O ₅)	kg/ha	Upto-15	Very less	0.0
		16-30	Less	0.0
		31-50	Medium	0.0
		51-65	On an average sufficient	0.0
		66-80	Sufficient	0.0
		Above 80	More than sufficient	40.0
Available Potassium (K ₂ O)	kg/ha	Upto 119	Very less	36.0
		120-180	Less	2.0
		181-240	Medium	2.0
		241-300	Average	0.0
		301-360	Better	0.0
		Above 360	More than sufficient	0.0

Present study is an attempt to find out the nutrient's quantity in soil of Dahegam Taluka, District- Gandhinagar, Gujarat. This information will help farmers to decide the amount of fertilizers to be added to soil to make the production economic.

Experimental

Ten villages, covering North, South, East and West, were selected from Dahegam Taluka (Table 1). A representative soil sample was collected from each village which represent soils of 4 to 10 farm's depending upon area of village. Representative soil samples were collected following standard quadric procedure and taken in polythene bag. In laboratory these samples were analysed for different chemical parameters (Table 2) following standard methods³. AR grade reagents and double distilled water were used for soil analysis. Results were compared with standard values⁴ to find out low, medium or high nutrient's content essential for STR.

Results and Discussion

Experimental values of quality characteristics of soil of the Dahegam Taluka are presented in the Table 3. Classification of soil quality of the Dahegam Taluka is presented in the Table 4.

Data presented in Table 4 shows that soils of 20% villages contain lower organic carbon and of 95% villages contained lower amount of potassium. Rest of the nutrients are in sufficient amount in soils of selected villages. Results are in tune with farming practices followed by farmers of this region. Most of the farmer's are using chemical fertilizers, urea and phosphatic fertilizers only, since last 25 to 30 years which contains concentrated amount of nitrogen and phosphorus and no organic carbon. Due to higher cost and rare availability of potassic fertilizers they are less preferred. On the basis of these results farmers are advised to use integrated nutrient management practice to maintain optimum concentration of all the essential nutrients for plants. Farmers are also advised to add biofertilizers containing phosphate and potash solubilising bacteria.

References

1. Sinha AK and Shrivastava. 2000. *Earth Resorces and Environmental Issues*. 1st edition. ABD Publisher Jaipur, India.
2. Miller RW and Donahue RL. *Soils in Our Environment*. 7th edition. Prentice hall, Inc, New Jersey-07362.
3. Jackson ML. 1967. *Soil Chemical Analysis*. Prentice-Hall of India Pvt.Ltd., New Delhi.
4. www.ifc.org.