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Assessment of Physico-chemical Characteristics of Soil collected from Various Locations of Chitrakoot Region, District Satna, Madhya Pradesh

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Abstract: *Chitrakoot is a town and a nagar panchayat in Satna district in the state of Madhya Pradesh, India. Geographical information of Chitrakoot district Satna in located at $24^0$48' to $25^0$12'N, and longitude at $80^0$58' to $81^0$34'E distance covered by district from east to west is 62 km and north to south is 57.5 km. Various soil quality parameters were analyzed by using standard procedures. Fifteen Soil sample were collected from two different areas of Chitrakoot region. The temperature-26.0 to30.0 ˚C, pH 6.6 to 8.3, Moisture-1.05 to 3.28%, N-4.30 to 32.09 mg/kg, P-0.22 to 2.96 mg/kg and K-28 to 57 mg/kg, all the result of all the parameters were below the SQGL recommended level*.

Keywords: *Physico-chemical Parameters, Soil, Chitrakoot region, Satna Distract*

1. INTRODUCTION

One of the most serious threats faced today by mankind is the pollution of our environment. In fact, most of the developed countries have already realized that the very existence of life on the earth may be endangered if suitable steps are not taken for the control and abatement of air, soil and water pollution [1]. Environmental pollution is one of the most serious problems facing humanity and other life forms on our planet today. Industrial effluents discharged into water bodies contain toxic chemicals, hazardous compounds like phenols, aldehydes, ketones, amines, cyanides, metallic wastes, plasticizers, toxic acids, corrosive alkalis, oils, greases, dyes, biocides, suspended solids, radioactive wastes and thermal pollutants from various industries [2].The contamination concentration in soil depends on the adsorption properties of soil matter its properties determined by organic matter. Variation of organic matter may be the predominant cause of variation in environment concentration in soil. [3] Most of the farmers are using excessive chemical fertilizers and the too much dose of such fertilizers in few soils has rendered high values of P and K. The retention of K could also be due the clay minerals formed by chemical weathering of basalts which is the parent material for the soil [4].Soil formation is a constructive as well as destructive process. Destructive process predominates the physical and chemical breaking down of materials, plants and animal structures, which result in the partial loss of more soluble and volatile products. Constructive forces develop new chemical compounds, both mineral and organic that provides new distribution or association characteristics, structural properties as well as chemical compositions. These factors influence the plant growth in the soil [5].

Chitrakoot is a town and a nagar panchayat in Satna district in the state of Madhya Pradesh, India. Geographical information of Chitrakoot district Satna in located at $24^0$48' to $25^0$12'N, and longitude at $80^0$58' to $81^0$34'E distance covered by district from east to west is 62 km and north to south is 57.5 km. The town lies in the historical Chitrakoot region; it attracts crowds throughout the year including above occasions and for Free Eye Hospital Camps. Noted 'Ayurvedic' and 'Yoga' centres like 'Arogyadham' are located in Chitrakoot. Chitrakoot means the 'Hill of many wonders'. Chitrakoot falls in the northern Vindhya Range of mountains spread over the states of Uttar Pradesh and Madhya Pradesh. The Chitrakoot region is included in the District Chitrakoot of Uttar Pradesh and the District Satna of Madhya Pradesh. Chitrakoot Parvat Mala includes Kamad Giri, Hanumaan Dhara, Janki Kund, Lakshman pahari, and Devangana famous Religious Mountains.

2. MATERIAL AND METHODS

2.1. Sample Collection

The N, P, K, analysis of soil during month of March 2015. The sampling stations were chosen at different site of the study area. For testing the soil sample were collected in different sterile plastic container cans from each station. After collection of the sample the containers were tightly capped and were immediately transported to the laboratory to avoid any unpredictable changes in the physio-chemical characteristics. Sample should be collected in clean and dry containers, and container should be rinsed thoroughly before collection of sample. Stopper the container after collections of the sample. Temperature, pH, Moisture Contents, N, P and K were analyzed in the soil samples during the sampling periods. Various soil quality parameters were analyzed by using standard procedures [6, 7].

Table1. *List of sampling locations*

S. No.	Sampling Location	Sampling code	Sampling Area	Depth in cm.
1	M.G.C.G.V Chitrakoot	(SR_1)	Residential area	12cm
2	Nears of Primary school	(SR_2)	Residential area	12cm
3	Right side of Kamtanath Mandir	(SR_3)	Residential area	12cm
4	In front of Branch Post office	(SR_4)	Residential area	12cm
5	Near Primary School	(SR_5)	Residential area	12cm
6	KarwiRood Hanumadhara	(SR_6)	Residential area	12cm
7	Near DRI Arogyadham	(SR_7)	Residential area	12cm
8	Near Tourist Bungalow Ramghat chitrakoot	(SC_1)	Crop area	12cm
9	Rajoula farm chitrakoot	(SC_2)	Crop area	25cm
10	Ramnathashramshala	(SC_3)	Crop area	25cm
11	1.5Km before in ramghat road	(SC_4)	Crop area	12cm
12	Infrant of satna bus stand	(SC_5)	Crop area	12cm
13	Nagar panchayat Bariyar	(SC_6)	Crop area	12cm
14	Near Brahmadev mandir	(SC_7)	Crop area	12cm

3. RESULT AND DISCUSSION

In the present study fifteen soil samples were collected from Chitrakoot region of Satna district. Various sampling station are chosen in study area like Rajoula farm, Rajoula, M.G.C.G.V., Kamtanath Mandir, Hanumadhara, Pilikothi, etc. All the parameters are characterize and interpreted. Soil samples were analyzed some physic-chemical parameter like pH, Temperature, Moisture Contents, N, P, K. Soil Samples were collected from two area located crop land and residential in part of the chitrakoot region. Parameters were mean, S.D., and C.V., values shown in **Tabel-2 and figure 1-6.**

3.1. Temperature

The Temperature is basically an important factor for its effect on chemical and biological reaction in soil. Minimum 26 ˚C and maximum 30 ˚C temperature were found in the crop land soil samples of Chitrakoot region. Temperature results of the all samples are given in table-2 and shown in fig .1. (*Tripathi et al. 2014*)[8] Studies of Physico chemical characteristics of soil in Shahdol District of Vindhya platue and reported the temperature was observed to be 28.64 ^{0}C to 42.28 ^{0}C.

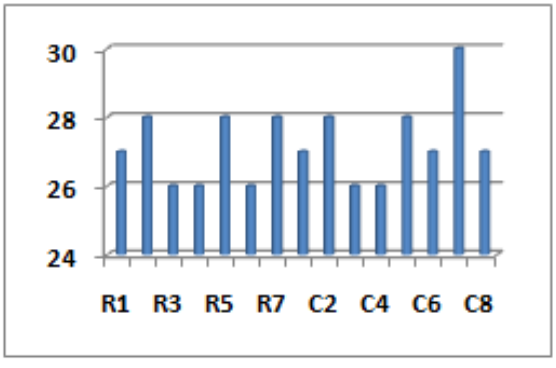

Fig1. *Graphical representation of the temperature*

3.2. pH

The pH of the soil taken from the depth of 15cm at different sites ranged from 7.2 to 9.0 which indicate that the soil is alkaline. Pandeeswari , N. et al, **2012,**[9] reported ranges of pH of soil were 5-8. Soil pH is an important consideration for farmers and gardeners for several reasons, including the fact that many plants and soil life forms prefer either alkaline or acidic conditions or the pH can affect the availability of nutrients in the soil.

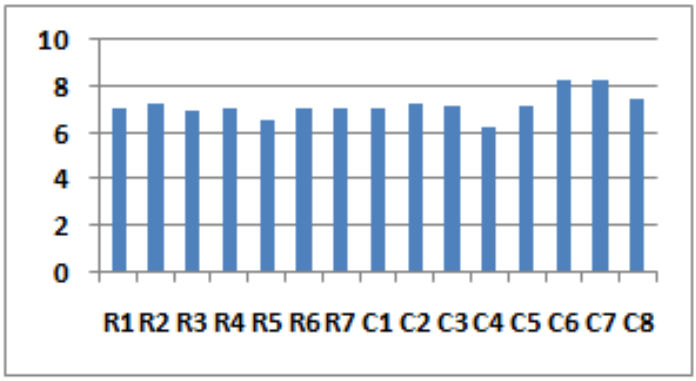

Fig2. *Graphical representation of the pH*

3.3. Nitrogen

Nitrogen contents in Soil of Chitrakoot region were analysed and reported. Its concentration ranged between 4.30 to 32.09 mg/kg. Nitrogen is the most important fertilizer element. Plants respond quickly to application of nitrogen salts. This element encourages above ground vegetative growth and gives a deep green color to the leaves. Plant roots take up nitrogen in the form of NO_3 and NH_4. The sample station R_3 (Kamta H.S.school chitrakoot) Showed maximum nitrogen concentration 32.09 mg/kg and Sample station R_7 (Arogyadham DRI) showed minimum concentration of nitrogen 4.30 mg/kg are shown in table-2. Indra Prasad Tripathi, et al, (2013) [10] Studies characterization of diffuse chemical pollution in Satna District and reported the Nitrogen content varied from 5.17 to 43.59 mg/kg. (*Tripathi et al. 2014*) [11] Studied concentration of Cr, Pb, Cd, Ni, Cu and Fe in soil of Umaria District, Vindhya Platue, India and reported N, are found to be 8.86 to 41.50 mg/kg,

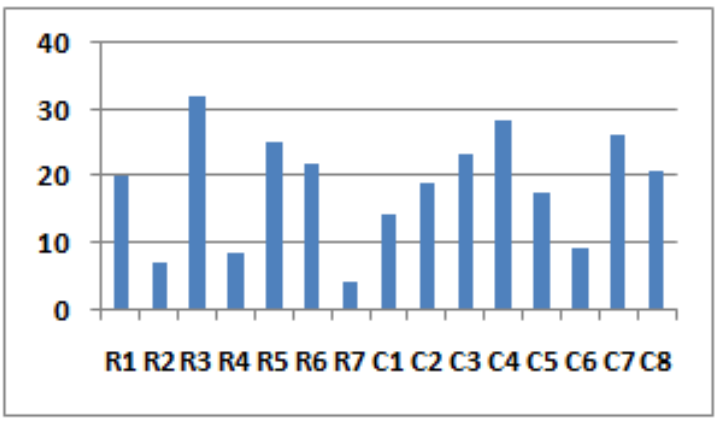

Fig3. *Graphical representation of the Nitrogen*

3.4. Phosphorus

Phosphorus is a part of every living cell in crop. The every activity of plant such as growth, respiration and reproduction depends upon phosphorus levels of the soil in which the crop growth. Jain Parul et al, (2014), [12] suggested phosphorus (P) is necessary for maintaining a balance between the other plant nutrients and ensuring the normal growth of the crop. In the present study the amount of available phosphorus at C_1 (Near Brahmadevmandir Mokamgar) 2.96 mg/kg, whereas at C_8 (Jankikund hospital chitrakoot) the phosphorus content is very less amount i.e. 0.22 mg/kg. *Sahoo et al, 2010*[13] carried out characterization classification and evaluation of soil of Longol Hill, Manipur for rationalland use planning and found phosphorus concentration 0.41to 2.89 mg/kg.

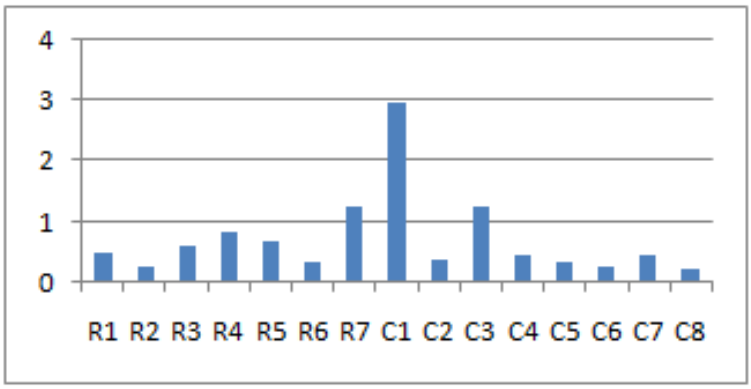

Fig4. *Graphical representation of the Phosphorus*

3.5. Potassium

The Potassium values were ranging between C_8 28 mg/kg to C_5 57 mg/kg. Maximum concentration of Potassium 57 mg/kg was observed at sampling stations C_5 (Satna bus stand). Dwivedi A.P., et al, 2013, [14]. carried out assessment of soil and ground water quality in rewa District of Vindhya platue and reported the potassium content ranged from 2.10 to 55.0mg/kg Potassium is not an integral part of any major plant component but it plays s key role in a vast array of physiological process vital to plant growth from protein synthesis to maintenance of plant-water balance [15]. All the values of N, P, and K, were below the recommended level of SQGL Value [16].

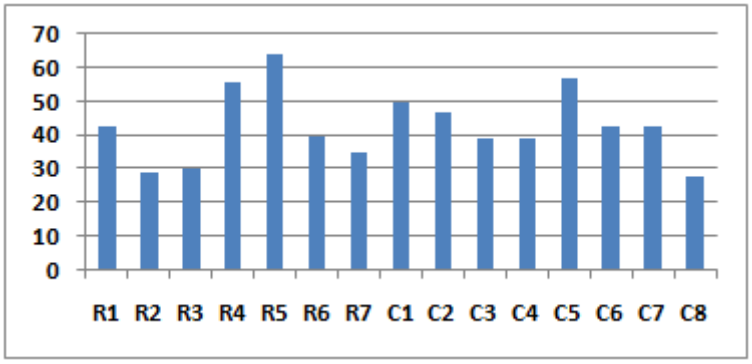

Fig5. *Graphical representation of the Potassium*

3.6. Moisture Content

Moisture content of samples was found 1.05 to 3.28%. In Chitrakoot region we have analyzed minimum moisture content in sample R_5 (Nayagaonthana) (1.05) and maximum value found in sample R_4 (Pilicothichitrakoot) (3.28). *N.S. Sonawane, et al* [76] Studied Soil Quality Assessment and Heavy Metal Contamination in Agricultural Soil in and around Toranmal (Triable Region) of Maharashta reported the moisture content 3.0 to 4.15. Moisture contents results of the all samples are given in table-2 and shown in fig.6.

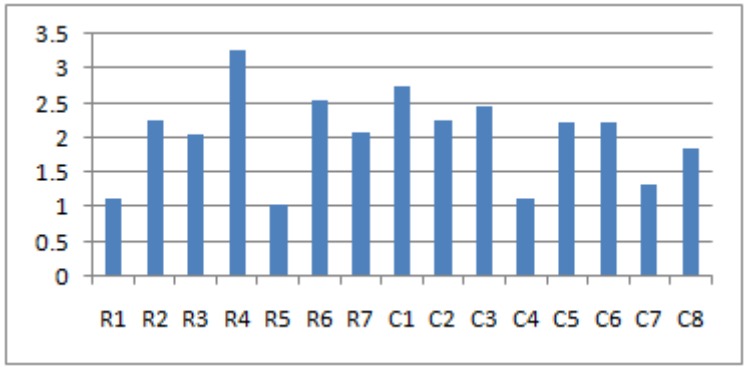

Fig6. *Graphical representation of the moisture content*

Table2. *Physico-chemical characteristic of soil collected from different areas of Banda City*

Parameter		Temp	pH	N mg/kg	P mg/kg	K mg/kg	Moisture Contents
Residential Area	SR1	27.0	7.1	20.25	0.50	43	1.13
	SR2	28.0	7.3	7.13	0.27	29	2.65
	SR3	26.0	7.0	32.09	0.62	30	2.06
	SR4	26.0	7.1	8.55	0.84	56	3.28
	SR5	28.0	6.6	25.19	0.69	64	1.05
	SR6	26.0	7.1	22.09	0.34	40	2.55
	SR7	28.0	7.1	4.30	1.27	35	2.07
Cropland Area	SC1	27.0	7.1	14.46	2.96	50	2.75
	SC2	28.0	7.3	19.21	0.38	47	2.27
	SC3	26.0	7.2	23.32	1.25	39	2.46
	SC4	26.0	63.0	28.5	0.45	39	1.14
	SC5	28.0	7.14	17.52	0.34	57	2.24
	SC6	27.0	8.3	9.22	0.26	43	2.23
	SC7	30.0	8.3	26.30	0.46	43	1.34
Mean	Mean	**7.229**	**27.200**	**2.071**	**18.611**	**0.723**	**42.86**
	S.D	**0.520**	**1.146**	**0.661**	**8.322**	**0.701**	**10.575**
	C.V	**7.193**	**4.213**	**31.961**	**44.715**	**96.957**	**24.669**

4. CONCLUSIONS

The study of Various Physico-chemical Parameters, Temperature, pH Moisture Content, N, P, and K were carried out by using various standard methods reported in the literature. Fifteen Soil sample were collected from two different areas of Chitrakoot region. The temperature-26.0 to30.0 ˚C, pH 6.6 to 8.3, Moisture-1.05 to 3.28%, N-4.30 to 32.09 mg/kg , P-0.22 to 2.96 mg/kg and K-28 to 57 mg/kg ,all the result of all the parameters were below the SQGL recommended level. It is concluded that the soil of chitrakoot region are not contaminated. Farmer arranges the amount fertilizers and nutrients needed to soil for increase the crop production.

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