



ANALYSIS OF SELECTED CHEMICAL AND PHYSICAL PARAMETERS OF SOIL OF JAMANIPALI AREA IN CHHAISGARGH

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ABSTRACT

For the purpose of investigation of selected soil parameters i.e. moisture, pH, electrical conductivity, total dissolved solid, organic carbon contents, nitrogen contents, total sulphur, the experimental method was used to detect them in each collected sample. The four sampling points were detected with 100 meter distance of every selected sample spot i.e. Jamni Pali area of Korba city. Soil samples were collected from Jamani Pali for two continuous sessions 2009. The researcher collected the soil sample from the area of Jamnipali. Taking a core or slice of the plow layer at intervals of 15-20 steps and composting them together in a bag. The site selected for sample collection should be cleared of weed growth and a 'V' shaped cut, which is plough layer deep was made. The inferential statistics was employed for the collected data. The results of study revealed the small difference in the values of selected parameters of soil in Jamnipali. It was also observed that in O.C. of soil small differences were observed with no clear seasonal variations. Nearly all the samples showed values below the essential limit as stipulated by standard agencies. Mining activities bring about serious heavy metal pollution.

Keywords: Soil, Parameters, Physical, Chemical, polluted contents

1. INTRODUCTION

The word environment has taken from the latine word Viron, which means circle. Environment is defined by Webster's dictionary as "The complex of climatic, edaphic and biotic factors that act upon an organism or on ecological community and ultimately determines it's from and survival." It is also defined as "The aggregate of social and cultural conditions that influence the like of an individual or community. According to the committee of Environmental health association of America environment comprises. "The Surroundings in which man lives, works and plays, it encompa the air he breathes, the water he drinks, the food he consumes and the shelter he provides for his protection against the elements. It also includes the pollutants and other detrimental environment factors which adversely affect his life and health (Jagdish, et.al. 2011).

Environment is divided into four components; these are Atmosphere, Hydrosphere, Lithosphere and Biosphere. Atmosphere contains different layers which can be defined according to air temperature. Hydrosphere is composed of all of water on the earth. Oceans, rivers ,lakes, pond sand the moisture in the air.The lithosphere contains solid and semisolid land of the crust. It is composed of soil particles Soil layer is a mixture of inorganic and organic solid matter, air water and micro-organism. The Biosphere is composed of all living organism(Kulkarni and Agrawal,2003)

Soil is a nature's most wonderful abundant and a useful component in our life. Soil plays an important role in human development and in the growths of living system; maintain the ecosystem and the water cycle. The chemical, physical and bacterial characteristics of soil determination are especially useful for irrigation. Out of the sixteen important and essential elements, thirteen elements are provided by the soil (Hendershot, et.al.1993)

Soil can be divided into three horizontal layers. The top layer consists of mostly organic matter and biological activities. The middle layer is the zone of maximum material accumulation and the bottom is mainly the parental material but slightly altered.(Mico, et.al.,2006)

Soil quality has been defined as "The capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhanced water and air quality and support human health and habitation (Fernandez, etal. 2007).

Soil quality is affected by incorporation of mining materials generating changes in pH, electrical conductivity, and heavy metal concentration etc (Iavazzo, et.al. 2011)

Organic matter play an important role in the physical, chemical and biological properties of soil. In the fundamental processes of evolution mineralization allow the transformation of organic residue into inorganic compounds in the soil, Atmosphere and Hydrosphere. Soil carbon and Nitrogen contents can vary considerably Garg (2002)

2. METHODOLOGY

The four sampling point were detected with 100 meter distance of every selected sample spot i.e. Jamni Pali area of Korba city. Soil samples were collected from Jamani Pali for two continuous sessions 2009.

The researcher collected the soil sample from the area of Jamnipali. Taking a core or slice of the plow layer at intervals of 15-20 steps and composting them together in a bag.

The site selected for sample collection should be cleared of weed growth and a 'V' shaped cut, which is plough layer deep was made. Then thin slice of soil was taken from one side of the cut so that the sample size should not too large .Ten to thirty well distributed cores or slices are

composited for this sample and about 1 Kg was taken from this as representative sample. Place the sample in water resistant paper bag. Label carefully with the location and depth of soil using aluminum foil label.

For the purpose of analysis of selected soil parameters i.e. moisture. pH, electrical conductivity, total dissolved solid, organic carbon contents, nitrogen contents, total sulphur, the experimental method was used to detect them in each collected sample.

3. RESULTS & DISCUSSION

Mean, Standard Deviation, Standard Error Deviation, were carried out for all obtained data using the commercially available software i.e. SPSS 16. The data analysis has been presented in Table 1-4.

During the assessment year 2009 moisture was found to be range of 3.15 to 20.63. The minimum and maximum data for moisture were recorded. at the sampling spot SKA, NTPC the moisture was ranged between 4.9, in April and 11.32, in June. At the sampling spot -B, NTPC the moisture was ranged between 4.82, April and 10.9 in September. At the sampling spot -C, NTPC the moisture was ranged between 4.06, April and 12.05 in July. At the sampling spot-D, NTPC the moisture was ranged between 3.51, April and 18.6 in June.

During the assessment year 2009 pH was found to be range of 3.62 to 8.32. The minimum and maximum data for pH were recorded at the sampling spot -A, NTPC the pH was ranged between 4.61, in February and 5.56, in September. At the sampling spot-B, NTPC the pH was ranged between 3.89, in October and 5.96, in August. At the sampling spot-C, NTPC the pH was ranged between 4.27, in April and 5.85, in January. At the sampling spot-D, NTPC the pH was ranged between 3.69, in October and 5.89, in January.

During the assessment year 2009 Electrical Conductivity (EC) was found to be range of 0.02 to 1.35. The minimum data for EC were recorded at the sampling spot -A, NTPC the EC was ranged between 0.09, in October and 0.82, in February. At the sampling spot-B, NTPC the EC was ranged between 0.06, in November and 0.41, in June. At the sampling spot-C, NTPC the EC was ranged between 0.04, in October and 0.36, in August. At the sampling spot-D, NTPC the EC was ranged between 0.09, in October and 0.38, in November.

During the assessment year 2009 TDS was found to be range of 300 to 1500. The minimum data for TDS were recorded at the sampling spot-A, NTPC the TDS was ranged between 1100, in April, September, October, December and 1500, in June. At the sampling spot -B, NTPC the TDS was ranged between 800, in October and 1100, in January. At the sampling spot -C, NTPC the TDS was ranged between 450, in October and 960, in June. At the sampling spot -D, NTPC the TDS was ranged between 650, in December and 1200, in March.

During the assessment year 2009 OC was found to be range of 0.04 to 2.16. The minimum and maximum data for OC were recorded at the sampling spot -A, NTPC the OC was ranged between 0.21, in June and 0.5, in October. At the sampling spot -B, NTPC the OC was ranged between 0.19, in March and 0.7, in April. At the sampling spot -C, NTPC the OC was ranged between 0.34, in July and 0.48, in January, February. At the sampling spot -D, NTPC the OC was ranged between 0.27, in December and 0.48, in July.

During the assessment year 2009 Nitrogen was found to be range of 140 to 450. The minimum and maximum data for Nitrogen were recorded at the sampling spot -A, NTPC the Nitrogen was ranged between 210, in February and 300, in December. At the sampling spot -B, NTPC the Nitrogen was ranged between 220, in March and 325, in July. At the sampling spot -C, NTPC the Nitrogen was ranged between 210, in March, April, September and 300, in

December. At the sampling spot -D, NTPC the Nitrogen was ranged between 190, in May and 250, in November.

During the assessment year 2009 Sulphur was found to be range of 25.3 to 84.5. The minimum and maximum data for Sulphur were recorded at the sampling spot -A, NTPC the Sulphur was ranged between 30.2, in March and 69.5, in July. At the sampling spot -B, NTPC the Sulphur was ranged between 35.4, in March and 48.5, in May. At the sampling spot -C, NTPC the Sulphur was ranged between 50.2, in March and 61.2, in August. At the sampling spot -D, NTPC the Sulphur was ranged between 29.8, in September and 50.8, in April

During the assessment year 2009 Magnesium was found to be range of 0.9 to 23.75. The minimum and maximum data for Magnesium were recorded at the sampling spot -A, NTPC the Magnesium was ranged between 6.89, in June and 8.42, in December. At the sampling spot -B, NTPC the Magnesium was ranged between 7.85, in July and 11.14, in April. At the sampling spot -C, NTPC the Magnesium was ranged between 6.38, in Sep and 9.01, in October. At the sampling spot -D, NTPC the Magnesium was ranged between 6.9, in July and 8.15, in October.

During the assessment year 2009 Calcium was found to be range of 0.2 to 11.05. The minimum and maximum data for Calcium were recorded at the sampling spot -A, NTPC the Calcium was ranged between 1.52, in March and 4.78, in August. At the sampling spot -B, NTPC the Calcium was ranged between 0.4, in June and 5.02, in November. At the sampling spot -C, NTPC the CALCIUM was ranged between 2.15, in December and 3.25, in June, July. At the sampling spot -D, NTPC the CALCIUM was ranged between 2.05, in March and 4.98, in July.

During the assessment year 2009 Magnejiium was found to be range of 0.334 to 11.62. The minimum and maximum data for Magnesium were recorded at the sampling spot -A, NTPC the Magnesium was ranged between .98, in January and 4.501, in September. At the sampling spot -B, NTPC the Magnesium was ranged between .452, December and 11.62 in April. At the sampling spot -C, NTPC the Magnesium was ranged between 0.352 September and 3.18 in June. At the sampling spot -D, NTPC the Magnesium was ranged between .42, September and 1.785 in June.

During the assessment year 2009 Zinc was found to be range of 0.021 to 12.05 The minimum and maximum data for Zinc were recorded at the sampling spot -A, NTPC the Zinc was ranged between 0.885 in April and 2.825, in July. At the sampling spot -B, NTPC the Zinc was ranged between 0.21, November and 2.356 in September. At the sampling spot -C, NTPC the Zinc was ranged between 0.357, April and 2.046 in July. At the sampling spot -D, NTPC the Zinc was ranged between 0.372, October and 12.058 in July.

During the assessment year 2009 Copper was found to be range of 0.102 to 5.65. The minimum and maximum data for Copper were recorded at the sampling spot -A, NTPC the Copper was ranged between 0.238, in May and 1.773, in April. At the sampling spot -B, NTPC the Copper was ranged between 0.199, May and 5.657 in April. At the sampling spot -C, NTPC the Copper was ranged between 0.144, May and 3.752 in April. At the sampling spot -D, NTPC the Copper was ranged between 0.145, April and .641 in March

TABLE 1
ANALYSIS OF SOIL SAMPLE -A AT NTPC JAMNIPALI DURING 2009

Variables	Range	Min	Max	Mean	Std.Dev	% CV	Std. Error
Moisture	4.9 - 11.32	4.90	11.32	6.29	2.008	31.90%	0.580
pH	4.61 - 6.56	4.61	6.56	5.64	0.583	10.34%	0.168
EC	0.09 - 0.82	0.09	0.82	0.31	0.208	67.48%	0.060
TDS	1100 - 1500	1100.00	1500.00	1216.67	119.342	9.81%	34.451
OC	0.21 - 0.5	0.21	0.50	0.38	0.081	21.56%	0.023
Nitrogen	210 - 300	210.00	300.00	224.58	26.152	11.64%	7.549
Sulphur	30.2 - 69.5	30.20	69.50	46.33	15.126	32.65%	4.367
Magnisium	6.89 - 8.42	6.89	8.42	7.68	0.594	7.74%	0.171
Calcium	1.52 - 4.78	1.52	4.78	3.97	0.831	20.94%	0.240
Magnese	0.98 - 4.501	0.98	4.50	3.29	0.991	30.14%	0.286
Zinc	0.885 - 2.825	0.89	2.83	1.70	0.642	37.85%	0.185
Copper	0.238 - 1.773	0.24	1.77	0.57	0.424	74.05%	0.122

TABLE 2
ANALYSIS OF OF SOIL SAMPLE -B AT NTPC JAMNIPALI DURING 2009

Variables	Range	Min	Max	Mean	Std.Dev	% CV	Std. Error
Moisture	4.82 - 10.9	4.82	10.90	7.64	2.273	29.74%	0.656
pH	3.89 - 5.96	3.89	5.96	5.10	0.756	14.84%	0.218
EC	0.06 - 0.41	0.06	0.41	0.20	0.106	52.14%	0.030
TDS	800 - 1100	800.00	1100.00	954.17	86.493	9.06%	24.968
O C	0.19 - 0.7	0.19	0.70	0.47	0.215	45.27%	0.062
Nitrogen	220 - 325	220.00	325.00	290.00	33.098	11.41%	9.554
Sulphur	35.4 - 48.5	35.40	48.50	41.43	3.352	8.09%	0.968
Magnisium	7.85 - 11.14	7.85	11.14	9.60	0.968	10.08%	0.279
Calcium	0.4 - 5.02	0.40	5.02	3.22	1.303	40.53%	0.376
Magnese	0.452 - 11.624	0.45	11.62	3.48	4.107	118.14%	1.185
Zinc	0.021 - 2.356	0.02	2.36	1.02	0.678	66.29%	0.196
Copper	0.199 - 5.657	0.20	5.66	0.95	1.502	158.42%	0.434

TABLE 3.
ANALYSIS OF SOIL SAMPLE-C AT NTPC JAMNIPALI DURING 2009

Variables	Range	Min	Max	Mean	Std.Dev	% CV	Std. Error
Moisture	4.06 - 12.05	4.06	12.05	7.00	3.088	44.12%	0.891
pH	4.27 - 5.85	4.27	5.85	5.08	0.403	7.93%	0.116
EC	0.04 - 0.36	0.04	0.36	0.21	0.114	53.71%	0.033
TDS	450 - 960	450.00	960.00	731.25	165.860	22.68%	47.880
OC	0.34 - 0.48	0.34	0.48	0.42	0.045	10.87%	0.013
Nitrogen	210 - 300	210.00	300.00	232.08	25.536	11.00%	7.372
Sulphur	50.2 - 61.2	50.20	61.20	55.90	4.080	7.30%	1.178
Magnisium	6.38 - 9.01	6.38	9.01	8.01	0.815	10.18%	0.235
Calcium	2.15 - 3.25	2.15	3.25	2.69	0.363	13.49%	0.105
Magnese	0.352-3.181	0.35	3.18	1.14	0.845	73.80%	0.244
Zinc	0.357-2.046	0.36	2.05	1.22	0.572	46.94%	0.165
Copper	0.144-3.752	0.14	3.75	0.73	0.963	131.59%	0.278

TABLE 4.
ANALYSIS OF SOIL SAMPLE -D AT NTPC JAMNIPALI DURING 2009

Variables	Range	Min	Max	Mean	Std.Dev	% CV	Std. Error
Moisture	3.51 - 18.69	3.51	18.69	6.98	4.115	58.96%	1.188
pH	3.69 - 5.89	3.69	5.89	4.99	0.651	13.06%	0.188
EC	0.09 - 0.38	0.09	0.38	0.25	0.086	34.46%	0.025
TDS	650 - 1200	650.00	1200.00	912.50	169.391	18.56%	48.899
O C	0.27 - 0.48	0.27	0.48	0.38	0.054	14.29%	0.016
Nitrogen	190 - 250	190.00	250.00	220.83	22.139	10.03%	6.391
Sulphur	29.8 - 50.8	29.80	50.80	43.09	8.557	19.86%	2.470
Magnisium	6.9 - 8.15	6.90	8.15	7.44	0.439	5.89%	0.127
Calcium	2.05 - 4.98	2.05	4.98	3.84	0.962	25.07%	0.278
Magnese	0.42 - 1.785	0.42	1.79	0.89	0.507	56.92%	0.146
Zinc	0.372 12.058	0.37	12.06	5.19	4.554	87.69%	1.315
Copper	0.145 0.641	0.15	0.64	0.40	0.157	39.20%	0.045

4. CONCLUSION

From above statistical analysis of collected data, it was observed that small differences were observed in values of Moisture , pH, electrical conductivity .(EC is directly

related to the concentration of ionized substance in soil), TDS, Sulphur, Mg, Ca, Mn, Zn, and Cu. It was also observed that in O.C. of soil small difference were observed with no clear seasonal variations. Nearly all the samples showed values below the essential limit as stipulated by standard agencies. Mining activities brings about serious heavy metal pollution.

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