Assessment of Soil Characteristics around Municipal Solidwaste Disposal site in sulur block- Coimbatore Town Panchayats- Tamilnadu, India

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. Solid waste is defined as those wastes from human & animal activities. In domestic environment the solid waste includes paper, food waste, plastics, ash etc. Soil is a dynamic system because of the presence of microorganisms and their biochemical activities liberating a lot of enzymes in soil, which become stabilized in soil by binding to soil components.[11] It is the environment for plant root system. It exhibits continuous interplay between the living and non-living components.Soil pollution and contamination is a serious problem especially in country as densely populated as India. Due to rapid industrialization, the soils in the industrial areas are polluted by various toxic substances such as heavy metals, pesticides, dioxins, polyvinyl compounds etc. from sourcesThe Present work was undertaken to analyse the physical chemical characteristics of the ground water in and around the municipal solidwaste 4 disposal sites town panchayats in Coimbatore .[12]The Chemical characteristics of Soil Samples like pH, EC, Mg, Na, K, Ca, Moisture content & Sodium Absorption Ratio were studied.

Keywords:Global positioning system, Soil Pollution,Impact, Disposal site.Leachates.

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1 INTRODUCTION

Solidwaste management is a global environmental problem in today world. The nature of solid waste shows that it is a highly heterogeneous material. The constituents general include anything and everything disposed by the municipal, commercial, and industrial establishments in the form of solids, the physical and chemical characteristics of solid waste are varying due to various factors such as geographical location. Deteriorating soil quality and decrease in vegetation abundance are grave consequences of open waste dumping which have resulted in growing public concern. The focus of this study is to assess the contribution of open waste dumping in soil contamination (SyedaMariaAli et.al.2013).The soil sample were collected at one feet and to feet depth around the solidwaste disposal site insulur block. Sample point was located using GPS. The Chemical characteristics of Soil Samples like pH, EC, Mg, Na, K, Ca, Moisture content & Sodium Absorption Ratio were studied.

MATERIALS AND METHODS

STUDY AREA

The Coimbatore is the third largest city in Tamilnadu and it is also proudly called as Manchester of South India for its immense growth of industrialization and urbanization Coimbatore city is situated in south India, has around 11º North latitude, 77º East longitude and 432.0m above mean sea level, while the city is flat, it is surrounded by hilly terrain, since it is situated at the foot of Nilgiri hills.. The maximum temperature observed in this city is 34º C and minimum temperature is 20ºC. This city has an average rainfall of 60 cm. The city has a population of 10, 93,888 spread over an area of 105 km².Coimbatore district is further sub divided as follows, 2Revenue Divisions –,6Taluks –12, Blocks –7Corporation & Municipalities –44,

Town Panchayats –Revenue Villages – 295,Panchayats villages – 389. The chemical industries, textile mills and various factories located in different areas in the city have been dumping their waste materials in the ground.In Coimbatore people mainly depend on the groundwater for their daily uses.The quality of groundwater is as important as itsquantity. The quality was assessed in terms ofphysico -chemical parameters. The usual and themost neglected cause of water pollution are uncontrolled dumping of Municipal Solid waste.**Description of Panchayats:**

Table 1.Number of villages in Coimbatore:

Sl no	Name of revenue block	No of villages
1	Karamadai	17
2	Madukkarai	9
3	P.N.Palayam	9

4	S.S.Kulam	8
5	Thondamuthur	10
6	Kinathukadavu	34
7	Annur	24
8	Sulur	17

We have collected the details of Village Panchayats which come under Coimbatore revenue block. There are 8 revenue blocks and consist of 128 Villages, in this study we select sulur block town panchayat in Coimbatore district has 17 village panchayats in that four village taken based on population and their details are given below.

TABLE 2: DETAILS OF TOWN PANCHAYATS

Location of sampling station around the disposal site were done by using GPS, at distance of 5m interval, it is given in the table below.

Name of the village/ Details	B1	B2	B3	B4	B5	B6
Population	24152	11940	18622	9898	26477	8732
Area(sq.km)	10.96	6.25	11.65	5.61	27	15
No of streets	204				61	64
No of wards	18	15	18	15	18	15
No of houses	8473	2985	4521	2275	8400	3481
No of hospitals	9	Nil	1	2	3	2
No of schools	4	3	10	7	11	2
No ofcolleges	3	2	1	-	4	2
No of industries	250	60	12	60	3200	-
Qty of waste generated (ton/dy)	7.925	1.5	4	2	7	2
Distance from Coimbatore(km)	16	15	20	17	30	30
Disposal site ward number	1	5	18	15	10	11
No of years disposal	15	6 to 7	15	4	10	10 to 15
Land used for disposal(acres)	2.75	1	0.5	-	1.5	0.5
Disposal Method	open land	open land	Open land	open land	open land	open land

Table 3: LOCATION OF SAMPLING

Disposal site	Sample	Latitude	Longitude	Distance from dumpyard (m)
B1	S_1	11'07995"N	77'19017"E	5
	S_2	11'07987"N	77'19014"E	10
	S_3	11'08026"N	77'19007"E	5
	S_4	11'08029"N	77'18999"E	10
B2	S_1	11'03404"N	77'13213"E	5
	S_2	11'03401"N	77'13215"E	10
	S_3	11'03501"N	77'13260"E	5
	S_4	11'03510"N	77'13272"E	10
	S_5	11'03462"N	77'13203"E	5
B3	S_1	11'02417"N	77'06287"E	5
	S_2	11'02420"N	77'06284"E	10
	S_3	11'02403"N	77'06262"E	5
	S_4	11'02410"N	77'06269"E	10
B4	S_1	11'00044"N	77'06137"E	5
	S_2	11'00049"N	77'06140"E	10
	S_3	11'00065"N	77'06133"E	5
	S_4	11'00069"N	77'06138"E	10

SAMPLING TECHNIQUE:

METHODS ADOPTED FOR SOIL SAMPLING:

The most undesirable sample collection device is the **shovel or scoop**. It is often used in soil sampling, but it is not a correct sampler because of its shape and its propensity for misuse. This technique is often used in agricultural sampling but, where samples are being taken for chemical pollutant analysis, the inconsistencies are too great. Samples can be collected using a shovel, scoop, or trowel if area and/or volume are not critical.Usually the shovel is used to mark out a boundary of soil to be sampled. The soil investigator attempts to take a constant depth of soil, but the reproducibility of sample sizes is poor. Soil Sample of about 2 kg where collected in fresh polythene bags from the field. For taking soil samples at particular point a V shaped cut was cut was made up to a

depth of 40cm, after removing the top soil. The soil collected in a fresh polythene cover by scraping the soil from the v shaped cut at a respective depth. The soil sample were collected at one feet and to feet depth around the solidwaste disposal site in sulur block. Sample point was located using GPS. The Chemical characteristics of Soil Samples like pH, EC, Mg, Na, K, Ca, Moisture

content & Sodium Absorption Ratio were studied.

RESULTS AND DISCUSSIONS

The various parameters were studied for soil namely pH, Electrical Conductivity, Calcium, Magnesium, Sodium, Potassium, Sodium Absorption Ratio (SAR) ,Organic matter & Moisture content. These following characteristics of the above parameters in the soil samples collected around dump yard & disposal site.

The various water parameters were studied namely pH, Electrical Conductivity, Calcium, Magnesium, Sulphate, Carbonates & Bicarbonates, Chlorides, Total Hardness, Dissolved Oxygen Total Dissolved Solids after that collected samples from Tube or Open well around The various parameters were studied for soil namely pH, Electrical Conductivity, Calcium, Magnesium, Sodium, Potassium, Sodium Absorption Ratio (SAR) ,Organic matter & Moisture content. These following characteristics of the above parameters in the soil samples collected around dump yard & disposal site.

Table 3.CHARACTERISTICS OF SOIL AT KARUMATHAMPPATTI SITE:

Sample	Depth (ft)	pH	EC	MC	OM	Ca^{+2}	Mg^{+2}	K	Na^+	SAR
S_1	1	7.78	1.04	6.592	2.2	4.8	10.4	13	52	18.86
	2	7.64	1.45	8.234	2.25	3.2	12.8	19	58	20.50
S_2	1	7.34	1.03	6.839	2.69	30.4	17.2	16	99	20.29
	2	7.12	1.93	8.365	2.68	40	17.2	19	79	14.77
S_3	1	7.65	1.03	7.023	3.02	15.2	12	21	89	24.13
	2	7.58	1.13	8.231	2.99	10	13.6	19	112	32.60
S_4	1	8.03	1.04	7.010	2.57	2.8	16.4	14	102	32.92
	2	7.99	1.25	8.555	2.48	1.6	17.6	10	130	41.96

Table 4.CHARACTERISTICS OF SOIL AT SULUR SITE:

Sample	Depth (ft)	pH	EC	MC	OM	Ca^{+2}	Mg^{+2}	K	Na^+	SAR
S_5	1	8.14	1.07	7.414	2.12	3.6	15.2	63	65	21.20
	2	7.65	1.54	8.112	2.63	3.6	12	51	83	29.72
S_6	1	7.98	1.45	6.839	2.98	4	10.4	18	72	26.83
	2	7.86	1.49	8.365	2.71	3.6	12.4	15	99	35
S_7	1	8.31	1.26	7.128	2.65	2.4	12	35	76	28.32
	2	8.24	1.72	8.114	2.02	4.8	10.4	26	109	39.54
S_8	1	7.57	1.87	6.174	2.00	3.2	14.4	21	92	31.03
	2	7.45	1.20	8.325	2.98	2.8	12.8	21	125	44.76
S_9	1	8.34	1.67	6.721	2.92	4	16	86	84	26.56
	2	8.27	1.19	8.242	2.30	4.4	14.4	63	102	33.27

Table 5. CHARACTERISTICS OF SOIL AT IRUGUR SITE:

Sample	Depth (ft)	pH	EC	MC	OM	Ca^{+2}	Mg^{+2}	K	Na^+	SAR
S_{10}	1	7.89	1.04	7.009	2.54	4.4	11.2	19	103	36.88
	2	7.64	1.03	8.945	2.15	4.4	15.6	13	85	26.88
S_{11}	1	8.12	1.04	6.405	3.20	4	12.4	21	53	18.51
	2	8.01	1.45	8.786	3.01	2	11.2	17	56	21.78
S_{12}	1	8.56	1.03	7.004	2.74	3.2	12	21	85	30.83
	2	8.42	1.2	9.342	2.64	2.4	11.2	13	72	27.61
S_{13}	1	8.34	1.16	6.974	2.01	4	9.2	21	93	36.20
	2	8.12	1.09	8.115	3.10	2.8	11.2	11	120	45.35

Table 6. CHARACTERISTICS OF SOILAT KANAMPALAYAM SITE:

Sample	Depth (ft)	pH	EC	MC	OM	Ca^{+2}	Mg^{+2}	K	Na^+	SAR

S_{14}	1	9.23	1.04	6.044	2.95	3.6	12.4	19	109	38.54
	2	8.63	1.02	8.632	3.06	2.4	9.2	19	105	43.6
S_{15}	1	9.26	1.03	6.843	2.47	3.2	11.2	22	76	28.32
	2	8.67	1.51	8.225	2.89	3.2	10.8	15	71	26.83
S_{16}	1	8.63	1.31	6.058	2.51	3.2	10	26	78	30.36
	2	8.11	1.01	9.041	2.65	3.2	15.2	25	56	18.46
S_{17}	1	8.42	1.03	7.238	2.45	5.2	15.6	20	116	35.97
	2	8.09	1.18	8.943	2.37	4	16.4	19	85	26.61

CHARACTERISTICS OF SOIL IN SULUR BLOCK

pH

pH or Hydrogen ion concentration is an important quality of natural soil.. The pH of natural soil lies between 7-8.5 and changes due to biological activity, temperature, disposal of municipal waste etc. The highest value of pH is 9.26 from S_{15} @ 2_{nd} feet and the lowest value is 7.12 from S_2 @ 2_{nd} feet. The sampling stations $S_1, S_3, S_4, S_5, S_6, S_7, S_8$ @ 1_{st} feet, $S_9, S_{10}, S_{11}, S_{12}, S_{13}, S_{14}, S_{15}, S_{16}, S_{17}$ falls within neutral range (7.5-8.5) and the remaining sampling stations S_2, S_8 @ 2_{nd} feet come under medium alkaline range.

Electrical Conductivity

The Electrical Conductivity is a total parameter for dissolved and dissociated substances. The neutral value of EC is 1ftS. The highest value of Electrical Conductivity from the collected samples is 1.93 from S_2 @ 2_{nd} feet and lowest value 1.01 from S_{16} @ 2_{nd} feet. The sampling stations remaining are comes under exceed the limits.

Moisture Content

The moisture content of soil sample characteristics imply the presence of leachate those likely to genetrate from the discarded solid waste. Insufficient generation of leachate tends to evaporate during summer meanwhile the residues remain in the soil, which contaminates the properties of soil. The observed range of soil samples were (7.414 to 6.044) & (9.342 to 8.112) for the depth of 1feet & 2feet respectively.

Organic Matter

Organic Matter is also an important parameter of soil. It occurs in soil where domestic waste is dumped. The soil in which organic content is high causes serious trouble to mankind and to vegetation. The highest value of organic matter from the sample collected is 3.2 of S_{11} and lowest is 2 of S_8. From the results obtained it is clear that the soil is suitable for agricultural purposes since top soil is darker than subsoil.

Calcium

Calcium occurs naturally as limestone, gypsum and apatite. It is an essential macro element. Calcium salts are non-toxic except at very high doses. However, an excess of calcium ions depresses the functioning of muscles and nervous system. The highest value of calcium from the collected samples is 40 ppm from S_2 @ 2_{nd} feet and the lowest value is 1.6 ppm from S_4 @ 2_{nd} feet.

Magnesium

It is an essential nutrient for living organisms as it forms part of the structure of the body and plays a critical role in cell metabolism. A high concentration of magnesium obtained in water has a laxative effect, especially on new users. The highest value of magnesium obtained from the collected samples is 17.6 ppm from S_4 @ 2_{nd} feet and lowest value is 9.2 ppm from S_{14} @ 2_{nd} feet and S_{13} @ 1_{st} feet.

Sodium

Sodium is a naturally occurring element of soil. Industrial and domestic wastes also add sodium to the sub-soil. In the present study sodium concentration is found to be highest in S4@ 2_{nd} a foot which is 130 ppm and the lowest is 52 ppm in S_1 @ 1_{st} feet.

Potassium

The concentration of potassium in soil sample characteristics from the above table ranges from (86 to 13) ppm for 1feet depth and (63 to 10) ppm for 2feet depth were found to be moder-

ate contamination.

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