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IMPACT OF MUNICIPAL SOLID WASTES ON GROUND WATER AND SOIL QUALITY AROUND THE ALWAL DUMPING YARD IN HYDERABAD

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ABSTRACT: In this study, a novel analysis method for identification of different soil and water parameters was carried out at the Alwal Dumping Yards of Municipal Solid Wastes in Hyderabad. In conventional soil and water analysis methods, available potassium (K) nutrient was determined by ammonium acetate extraction with flame photometer. Soil analysis was studied and the pH was found to be 6.4. The E.C of soil was 0.67, organic carbon was 0.85% and Moisture content of the soil was 97.6. Phosphorus and Potassium content were 7.43 kg/h and 8.34 kg/h respectively in the soil. This study leads us to the conclusion of the nutrient's quantity present in soil and water of around the Dumping Yards. Results show that all the selected places around the Dumping Yards have medium or high minerals content. In order to study the effect of dumping yards on the water and soil quality, these studies will help to solve the problems related to soil nutrients, amount of which fertilizers to be used to increase the yield of crops.

KEYWORDS: Soil analysis, Dumping Yards, Potassium, Phosphorus.

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1. INTRODUCTION

Soil is a vital component, medium of unconsolidated nutrients and materials, forms the life layer of plants. It is a basic life support components of biosphere. The physicochemical study of parameters reports are generally tailored to provide the required information for both physical and chemical fertilities of the soil. Some soil reports may also include biological analysis. Soil physical fertility represents the ability of the soil to store and conduct water, nutrients and gases. Whereas soil chemical fertility indicates whether there are enough available nutrients for plant growth, or whether fertilizers are needed to correct deficiencies. Soil physical fertility information should include soil

texture while the chemical fertility information should cover cation exchange capacity (CEC), the percentage of exchangeable cations, pH, electrical conductivity (EC), organic carbon (matter) and the concentrations of essential macro and micronutrients in the soil, as well as some other elements such as aluminum, lime, gypsum or dolomite requirements are also included. The chemical tests should address accurately both nutritional and toxicity considerations. Ideally, the soil test should not only identify whether a nutrient deficiency exists, but also the degree of deficiency in terms of expected yield loss. It is important that the quantity of nutrient required to correct the deficiency is then determined by field calibration trials. An ideal soil test is one that is reproducible and rapid, as well as being reliably correlated with local responses in plant yield or nutrient uptake. [3-6].

2. MATERIALS AND METHODS

Soil is a vital component, medium of unconsolidated nutrients and materials, forms the life layer of plants. It is a basic life support components of biosphere. The physicochemical study of parameters is important to agricultural chemists for plants growth and soil management. [1-2]. Soil analysis reports are generally tailored to provide the required information for both physical and chemical fertilities of the soil. Some soil reports may also include biological analysis. Soil physical fertility represents the ability of the soil to store and conduct water, nutrients and gases. Whereas soil chemical fertility indicates whether there are enough available nutrients for plant growth, or whether fertilizers are needed to correct deficiencies. Soil physical fertility information should include soil texture while the chemical fertility information should cover cation exchange capacity (CEC), the percentage of exchangeable cations, pH, electrical conductivity (EC), organic carbon (matter) and the concentrations of essential macro and micronutrients in the soil, as well as some other elements such as aluminium, lime, gypsum or dolomite requirements are also included. The chemical tests should address accurately both nutritional and toxicity considerations. Ideally, the soil test should not only identify whether a nutrient deficiency exists, but also the degree of deficiency in terms of expected yield loss. It is important that the quantity of nutrient required to correct the deficiency is then determined by field calibration trials. An ideal soil test is one that is reproducible and rapid, as well as being reliably correlated with local responses in plant yield or nutrient uptake. [3-6].

Description of study area

The samples were collected around the Alwal Dumping Yards in Hyderabad. Soil and water samples were collected and stored at room temperature.

Soil Sampling

The soil samples were collected as per the standard procedures, three sampling stations were selected in study area in summer and winter season, from February 2018 to March 2018. The soil samples were collected at the depth of about one foot, from different station under study for proper sampling, certain sampling tools such as augur, spade, buckets, and baskets were used.

Collection and preservation of soil samples

Fresh soil samples around the Dumping Yards (n = 10) were randomly collected from locations similar to where water samples were collected. The soil samples were collected (500 g each time) close (1–10 cm perimeter) to the soil/water by digging into the soil (1–5 cm depth).The collected samples were stored in clean, sterile polyethylene bags and were properly labeled. They were immediately sent to the laboratory and were stored at −20 °C to reduce the risk of hydrolysis or oxidation prior to analysis.

Preparation of soil/ sediment sample

The collected soil/sediment samples were dried in shade by spreading on a wooden plank. During drying process, lumps were broken by wooden mallet. The rocky lumps were discarded. The fine soil was thoroughly mixed by rolling up the sides after complete mixing, the soil was brought in the center and the heap was leveled. The soil heap was divided into four quarters. The opposite quarters were taken so the amount of soil sample was reduced to one half. The above process of mixing, leveling and dividing of soil was continued until we got, 1kg of the soil. The soil sample was then passed through 2 mm sieve and packed into labeled polythene bags. The bags were completely filled to exclude oxygen as far as possible. The contamination of soil sample with any foreign material was totally avoided with great care.

1:5 Soil / Sediment water extract

50 gm powder soil / sediment sample was mixed with 250 ml of de-ionized water and stirred mechanically for about 1 hr., at regular intervals. This mixture was filtered through Whatman filter paper using Buchner funnel and vacuum pump. This extract was used for the determination of various physico-chemical parameters of soils.

Water sample collection

Water samples were analyzed within a few hours of collection. The pH was measured at the collection site, determination of conductance, total alkalinity, bicarbonate, and hardness, Potassium, Phosphate contain were carried out by standard methods. Chemicals used for the present investigation were A. R. Grade and double distilled water was used for preparing various solutions. The sampling points were chosen to cover the entire span of 3km study area of around the Dumping Yards. After preliminary survey of the area, three sampling stations along the dumping yard were chosen for the study to obtain a good distribution of the area, to evaluate the overall quality. About three samples were collected from each station as per specification and then analyzed periodically for physical and chemical characteristics during the course of present study.

Extraction and Preparation of water samples

The 10 ml of water sample was acidified with con. HNO3 (A.R.) and evaporated up to dryness on hot plate, Further 25ml of Con. HNO3 was added and heated again near to boiling till acid was evaporated to a small volume. To this mixture, 10 ml of con HNO3 and 2 ml of 6% H2O2 were

added and evaporated to dryness for complete ashing of the organic matter. This residue was dissolved in small amount of Hcl and warm distilled water. The final extract was colorless. The contents were filtered, neutralized with NH4 OH and made up to 100 ml in volumetric flask. This extract was used for the detection of metal ions in industrial effluents and ground water samples.

Soil and water physico-chemical analysis

The soil and water pH was determined in soil water suspension (1:2:5) using a pH meter (Jackson, 1973), Electrical conductivity was determined 1:2 ratio of soil water suspension by conductivity meter (Jackson, 1973), nitrogen by kjeldahl method using Kjeltech autoanalyser 1030 (Piper, 1966) and phosphorus by calorimetrically employing vanado- molybdate method. Potassium was estimated by using flame photometer with determined with neutral normal ammonium acetate solution (Stanford and English, 1949). Organic carbon was estimated by Walkey and Black wet digestion method (Piper, 1966).

Soil analysis

Table 1: Variation in different parameter of soil samples (control)

Sample No .	pH	E.C	C-org(%)	Moisture content(%)	Coductivity(dSm-1)	P	K
1	7.3	0.45	0.76	97.0	0.10	4.9	8.4
2	7.4	0.50	0.78	97.2	0.18	5.2	8.8
3	7.3	0.55	0.79	97.3	0.20	4.8	8.9

EC- mS/cm. P & K- Kg/hectre

Table 2: Variation in different parameter of soil samples near Dumping yards

Sample No .	pH	E.C	C-org(%)	Moisture content(%)	Coductivity(dSm-1)	P	K
1	6.3	0.65	0.85	97.5	0.05	4.7	7.4
2	6.4	0.62	0.84	96.8	0.07	4.8	6.8
3	6.3	0.64	0.80	97.1	0.15	4.5	7.2

The Conductivity study of soil samples shows variation in conductivity values between 0.05 mS/cm to 0.15 mS/cm this value suggest normal soil. Percentage of carbon varies from 0.80 to 0.85 also shows normal soil. Percentage of P and K are also in normal range.

Water analysis

Physical chemical properties of water samples was studied, all the samples are light brown in color and have unpleasant smell.. The pH range of 7.0 to 8.1 has been recommended optimum for organisms growth, the pH of water samples shows variation 7.0 to 8.1, the above 7.5 value of pH shows basic nature. These values are shown in table no 3 and 4. The Conductivity study of water samples shows variation in conductivity values between 81.2 mS/cm to 95.0 mS/cm this value

suggest normal water. Percentage of TDS varies from 19 to 34 also shows normal water. Percentage of Turbidity and TSS are also in normal range.

Table 3: Physical-chemical parameters of water samples (Control)

Sample No.	pH	Conductivity(µS/cm)	Turbidity	TSS(mg/L)	TDS(mg/L)
1	7.0	85.62	1.75	2.83	28
2	7.5	84.32	1.84	2.44	24
3	7.4	84.57	1.34	2.79	26

Table 4: Physical-chemical parameters of water samples near dumping yards (samples)

Sample No.	pH	Conductivity(µS/cm)	Turbidity	TSS(mg/L)	TDS(mg/L)
1	6.82	77.42	2.2	1.88	22
2	6.01	76.35	2.4	2.63	27
3	6.15	78.43	2.6	1.47	26

3. RESULTS AND DISCUSSION

Physical chemical properties of soil and water samples were studied, all the soil samples are black gray in color and have unpleasant smell. The pH of soil is one of the most important physicochemical parameter. It affects mineral nutrient soil quality and much microorganism activity. The pH range of 7.3 to 8.4 has been recommended optimum for plants growth, the pH of soil samples shows variation 6.3 to 6.4, the below 7.5 value of pH shows acidic nature. The pH of water is one of the most important physicochemical parameter. It affects mineral nutrient water quality and much microorganism activity. The pH range of 7.3 to 8.4 has been recommended optimum for plants growth, the pH of water samples shows variation 6.0 to 6.8, the below 7.0 value of pH shows slight acidic nature. The conductivity, TSS and TDS values are more than permissible levels. Turbidity is more than limit. These values are shown in table no 1 and 2.

4. CONCLUSION

The physicochemical study of soil and water parameters is important to agricultural chemists for plants growth and soil management. A physicochemical study of soil and water samples from three places of around the Alwal Dumping Yards in Hyderabad, shows that all the soil and water parameters conductivity, pH %, %P, %K and % Organic carbon, TSS, TDS are varied with normal range. These studies give information about nature of soil, present nutrient in soil, according to this information farmer arrange the amount of which fertilizers and nutrients needed to soil for increase the percentage yield of crops.

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CONFLICT OF INTEREST

The author declares that, there is no any conflict of interest exists.

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