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GEOCHEMISTRY OF SOIL SAMPLES IN YENDADA AREA, VISAKAHAPATNAM

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ABSTRACT

Soil testing is a rapid chemical analysis to assess the available nutrient status and reaction of a soil. Four different soil samples were collected from Yendada region of Visakhapatnam with varying utility. The soils were subjected to systematic analysis. Based on the values of the physico-chemical parameters, the quality of soil was inferred and discussed.

Keywords: Visakhapatnam; Analysis; Physico-chemical parameters

INTRODUCTION

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[1,2]. It is the environment for plant root system. It exhibits continuous interplay between the living and non-living components [3]. 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 diverse sources. A wealth of information on occurrence of changes in properties of soils due to discharge of effluents from various industries is available [4-8].With the increasing trends of urbanization, there is lot of production of sewage water[9, 10]. The generation of wastewater per capita is higher in large cities compared to small towns [10, 11]. During the production of organic chemicals, wastes enter into the sewage system and thus cause pollution in soil which results in water-borne diseases [3].

In our view soil quality must measure the capacity of soil to support ecosystem functions, to sustain biological productivity. Therefore soil quality is not concerned with rating or comparing the suitability of different soil types for a specific use, such as agriculture. Instead, soil quality is concerned with evaluating the condition of a particular soil in relation to its potential capacity.

Therefore, the focus on soil quality is on properties or processes inspected by soil management [12]. Although soil has many functions and uses, in our present study, we focused on the evaluation of some physical and chemical parameters of soil quality for better soil management.

EXPERIMENTAL

Study Area

Visakhapatnam is being promoted as the second-best city in Andhra Pradesh after Hyderabad -- and quite similar to the latter's development, one side of Visakhapatnam towards Madhurvada is being developed as the knowledge city. The other side from the steel plant to Elamanchili will be the hub of industrial activity [13]. Visakhapatnam, or simply vizag is a charming port town dotted with residential enclaves, villas, clubhouses and lifestyle hot spots. All the makings of an elite urban setting classic. The global entropolis, yendada (17°46'47"N 83°21'39"E), madhurawada, at vizag. A new landmark for the burgeoning city.

Sampling

The soil samples used in the present study area were collected from different locations of Yendada. Nursery garden soil, solid waste dumping and burning site, sewage effluent overflow soils and soils near

the main sewer outlet were collected. After selecting the sampling sites, the surface litter was removed. Spade is used to dig the soil. The soils were collected in polythene bags. 1 kg of soil was collected, sealed and properly labelled. The soils were taken to the laboratory. The samples were air dried and sieved under 2 mm sieve and analyzed within 24 hours of sampling.

RESULTS AND DISCUSSIONS

The various soil samples collected from different sites in Yendada were analyzed for their physico-chemical characteristics[14]. The colour of the samples ranged from dark brown in garden soils to light brown at canteen solid waste dump site. The fertility of the garden soil can be known by the dark colour [15]. In garden soil the texture of soil was fine sand and that of canteen dump site was nearly clay sand. The above results indicated that solid waste dumping on soil has lower sand and higher clay content. The pH of soil samples range between 6.32-8.16 which happens to be the range for neutral to alkaline soils. Highest pH is found canteen dump site. pH can affect the absorption of nutrients by plant roots. pH values above 7.5 cause iron, manganese, copper, zinc and boron ions to be less available to plants. The conductivity values are found to range between 0.2-2.7mmhos. The high electrical conductivity in solid waste dump site may be due to accumulation of organic wastes and salts.The water holding capacity ranged 22.203-37.125%. The high water holding capacity is seen in Nursery garden soil as the humus content is high in garden soil. The water holding capacity of all the samples are relatively good[16].

Organic carbon content accounts for as much as one third or more than any other single factor, for the stability of soil aggregates. Furthermore, organic carbon supplies energy for most of the microorganisms. The organic carbon content ranged from 6.1-6.7%. Thus this parameter is somewhat constant in all the samples. Humus enhances mineral breakdown and, in turn, nutrient availability to plants. It increases the water holding capacity in the soil. Soil humus values are found to range between 0.282-10.4%, the highest value was observed for garden soils.

Calcium accumulates in plants as calcium pectate and is essential for the growth of meristems and root tips.at higher concentrations; calcium disturbs the organic acid metabolism in calcium sensitive plants. Calcium for all samples were found to be in the range of 3.603-6.886%. The highest concentration is found in nursery garden soil. Magnesium is widely distributed in soils and is mainly involved in the activation of many enzyme complexes and also in phosphorous transfer process. The values ranges between 0.146-0.446%, the highest being for nursery soils. The available form of sulphur to plants is sulphates which is normally present in soils under aerobic conditions. The sulphates were found to range between 0.55-0.59%. The highest value was found in nursery soils which may be due to the addition of fertilizers. Phosphates have a greater affinity for soil and are generally carried along with water and thus make it unavailable for plants. The values of phosphates range between 0.0106-0.875%, the highest being for the main sewer outlet.

CONCLUSION

From the result it can be concluded that garden soil was having high water holding capacity due to the humus content and high sulphate content. The high content of nitrates in the sewer overflowing water was due to the presence high nitrates in the sewage effluent of domestic origin. The direct dumping of solid waste on the soil has considerably changed the quality making it unsuitable for cultivation.

The use of treated waste water reduces the load of toxic elements in soil and thereby limits their entry into food chain. Hence with appropriate technology, the sewage wastewater can be utilized beneficially in agriculture. It is also necessary to characterize such waters for assessing their suitability and proper utilization. It is also necessary to assess the nature and extent of soil and plant contaminants due to use of sewage water for irrigation [10].

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Table-1: Physico-Chemical Characteristics of Soil Samples in Yendada Region of Visakahpatnam

Parameters	**S1**	**S2**	**S3**	**S4**
Colour	Dark Brown	Reddish Brown	Reddish Brown	Light Brown
Texture	Fine Sand	Fine Sand	Nearly Clay Sand	Coarse Sand
Bulk Density (gm/cc)	1.176	1.249	1.236	1.261
pH	6.32	7.89	8.16	7.79
Conductivity (mmhos)	0.2	1.1	2.7	1.27
Water Holding Capacity(%)	37.125	24.462	26.146	22.203
Organic Carbon (%)	0.61	0.67	0.64	0.64
Soil Humus (%)	10.4	0.329	0.399	0.282
Calcium (mg/gm)	6.886	6.8	4.8	3.603
Magnesium (mg/gm)	0.446	0.146	0.328	0.167
Available Phosphorous (%)	0.06875	0.875	0.0456	0.0106
Available Sulphur (%)	0.55	0.59	0.56	0.575

In the given samples

S1-Soil Sample from Nursery gardens

S2-Soil Sample from main sewer outlet

S3-Soil Sample from Solid waste dump site

S4-Soil Sample from Sewer outlet